



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

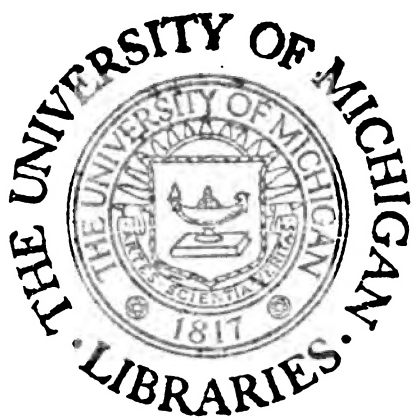
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

JOURNAL

1904.

PRICE SIX SHILLINGS NETT.

Published by
CHARLES & EDWIN LAYTON, Farringdon Street,
London, E.C. ;

and Printed for the Federation by
James Hedderwick & Sons Limited,
24 St. Vincent Place, Glasgow.

1905.

[*Entered at Stationers' Hall.*]

HG
8016
.C49

CONTENTS

	PAGE
Officers of the Federation,	v
Examiners, 1904-1905,	vi
List of Subscribing Offices,	vii
Treasurer's Statement, 1903,	viii
The Federation of Insurance Institutes of Great Britain and Ireland,	ix
Institutes affiliated with the Federation,	xiv
Conference, Edinburgh, 1904, and Report of Executive, 1904, ...	xvii
Address by the President (Mr. David Deuchar, Edinburgh),...	xxi
Memorial Notice—The late Mr. David Deuchar,	xxix
Report of the General Committee of the Insurance Clerks' Orphanage,	xxxiii
Accounts and Balance Sheet Insurance Clerks' Orphanage ...	xxxvi
Constitution of the Federation	xxxix
Bye-laws	xlv
"A Few Remarks upon the Arbitration Clause." By J. Scott Cavell, <i>Norwich Insurance Institute</i> ,	177
"A Life Office Prospectus." By James Stirling, F.F.A., <i>Insurance and Actuarial Society of Glasgow</i> , November 16, 1903,...	183
"Automatic Sprinklers and their Water Supplies." By W. E. Astley, <i>Insurance Association of Manchester</i> , April 14, 1904,	135
"Canada: Some of its Fire Insurance Problems." By C. R. G. Johnson, <i>Insurance Institute of Montreal</i> , January 21, 1904, ...	117
"Consequential Loss." By Herbert R. Clough, <i>Nottingham Insurance Institute</i> , March 25, 1904,	331
"Gun and Small-Arms Factories." By A. E. Patrick, <i>Insurance Institute of Birmingham</i> , April 29, 1904,	149
"Municipal Trading and Fire Insurance." By W. Holbrook, <i>Insurance Institute of Yorkshire</i> , March 1904,	287

"Notes on Investments." By John Robb, <i>Insurance Institute of South Africa</i> , December 1903,	343
"Observations on Medical Examination in connection with Life Assurance." By Barclay J. Baron, M.B., Edin., <i>Insurance Institute of Bristol</i> , February 1904,	255
"Old Age Pensions." By Duncan C. Fraser, M.A., F.I.A., <i>Insurance Institute of Newcastle-upon-Tyne</i> , January 22, 1904,	305
"Printers' Risks." By D. M. Cameron, <i>Insurance Society of Edinburgh</i> , February 2, 1904,	69
"Shirt Factories." By James M. Scott, <i>Insurance Institute of Ireland</i> , December 3, 1903,	59
"Shop Risks." By J. S. Waterstone, <i>Insurance Institute of Newcastle-upon-Tyne</i> , February 28, 1904,	21
"Soap and Candle Factories." By J. Mason Guttridge, <i>Insurance Institute of Bristol</i> , February 1904,	49
"The Electrical Driving of Cotton Mills." By A. Kelly, A.M.I.E.E., <i>Insurance Institute of Manchester</i> , December 8, 1903,	1
"The Main Principles to be followed in the Selection of Lives by a Life Assurance Company." By John B. Hall, A.I.A., <i>Insurance Institute of Toronto</i> , April 1904,	209
"The Principles of Organisation in an Insurance Office." By T. A. Young, B.A., F.I.A., <i>Insurance Institute of Manchester</i> , February 8, 1904,	267
"The Theory and Practice of Fire Insurance Business." By Burdus Redford, <i>Newcastle Insurance Institute</i> ,	375
"The Theory and Practice of Fire Insurance Business." By Pat. B. Carphin, <i>Sun Insurance Office</i> , Dublin,	401
"The Value of New Business to a Life Office." By D. Y. Mills, <i>Insurance Society of Edinburgh</i> , March 1, 1904,	197
"Weights and Measures." By C. E. Galwey, A.I.A., <i>Insurance Institute of New Zealand</i> , August 11, 1904,	353
Examination Papers, 1904,	421
Names of Successful Candidates, 1904,	446
The Insurance Institute of Toronto—Results of 1904 Examinations,	460
Index to Volumes I. to VI. inclusive,	463

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

PRESIDENT.

THOMAS A. BENTLEY (*London and Lancashire Fire, Manchester*).

Past Presidents.

JAMES OSTLER (*Northern, Manchester*), 1897.

F. DALTON (*Norwich Union, Birmingham*), 1898.

J. B. TENNANT, F.I.A. (*Friends' Provident, Bradford*), 1899.

S. G. MOXEY (*Prudential, Bristol*), 1900.

DAVID L. LAIDLAW (*North British and Mercantile, Glasgow*), 1901.

BERNARD H. O'REILLY (*Patriotic, Dublin*), 1902.

JOHN G. BOSS (*Royal, Newcastle-on-Tyne*), 1903.

DAVID DEUCHAR, F.F.A., F.I.A., F.R.S.E. (*Caledonian, Edinburgh*), 1904.

Executive.

Any Two Delegates from each of the FEDERATED INSTITUTES.

Note.—Should a Delegate be unable to attend a Meeting, he may be represented by any member of the Institute with which he is connected.

Publications Committee.

Two Representatives from the INSTITUTE OF BIRMINGHAM
and Two from the INSURANCE AND ACTUARIAL SOCIETY OF GLASGOW.

Honorary Secretary to the Publications Committee, *pro tem.*:

JOHN ROBERTSON (*Northern, Glasgow*).

Executive Committee of Examiners.

MANCHESTER INSTITUTE.

NEWCASTLE-ON-TYNE INSTITUTE.

W. HARTLEY (*London and
Lancashire Fire*).

JOHN G. BOSS (*Royal*).

J. H. CHAPMAN (*Norwich Union*).

ROBERT McCONNELL (*Royal*).

YORKSHIRE INSTITUTE.

J. B. ROBERTS (*Sun Fire*). WILLIAM HOLBROOK (*Royal*).

Honorary Secretaries to the Examiners.

J. P. EDDISON (*North British and Mercantile, Leeds*).

A. W. SNEATH (*Hand-in-Hand, Leeds*).

Honorary Treasurer.

THOMAS A. BENTLEY (*London and Lancashire Fire, Manchester*).

Honorary Auditors.

G. L. LAMBERT (*North British and Mercantile, Manchester*).

ROBERT McCONNELL (*Royal, Manchester*).

Secretary.

CHARLES STEVENSON, 9 Albert Square, Manchester.

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

EXAMINERS 1904-05.

- A. BLAIR, *London and Lancashire Fire*, Glasgow.
J. HEADON BOOCOCK, *Commercial Union*, Birmingham.
JOHN G. BOSS, *Royal*, Newcastle-on-Tyne.
CHARLES D. BUTLER, *Royal Exchange*, Birmingham.
SAMUEL BUTLER, *London and Lancashire Fire*, Newcastle-on-Tyne.
J. H. CHAPMAN, *Norwich Union Fire*, Newcastle.
H. D. CURNICK, *Norwich Union Fire*, Manchester.
J. P. EDDISON, *North British and Mercantile*, Leeds.
A. S. FRASER, *Commercial Union*, Dundee.
JAMES GEMMELL, *Royal Exchange*, Glasgow.
F. S. GOGGS, A.I.A., *Scottish Metropolitan*, Edinburgh.
CHARLES H. GREEN, *Sun Life*, London.
N. B. GUNN, F.F.A., F.I.A., *Scottish Amicable*, Glasgow.
J. MASON GUTTRIDGE, M.I.E.E., *Alliance*, Bristol.
W. HARTLEY, *London and Lancashire Fire*, Manchester.
JAMES HASLAM, *Ocean*, Nottingham.
CHARLES HOBBINS, *Rock*, Manchester.
WILLIAM HOLBROOK, *Royal*, Leeds.
CHARLES E. HOWELL, B.A., LL.D., *Standard*, Dublin.
OWEN D. JONES, *London and Lancashire Fire*, Leeds.
W. S. KINNEAR, B.A., *Royal Exchange*, Dublin.
DAVID L. LAIDLAW, *North British and Mercantile*, Glasgow.
G. L. LAMBERT, *North British and Mercantile*, Manchester.
ROBERT McCONNELL, *Royal*, Manchester.
W. G. NEISH, *Northern*, Newcastle.
PHILIP L. NEWMAN, B.A., F.I.A., *Yorkshire*, York.
JAMES OSTLER, *Northern*, Manchester.
H. J. PEARCE, F.F.A., *Scottish Amicable*, Glasgow.
H. POCKLINGTON, *Commercial Union*, Leeds.
W. RICHARDSON, *Norwich Union Fire*, Edinburgh.
J. B. ROBERTS, *Sun Fire*, Leeds.
JOHN ROBERTSON, *Northern*, London.
R. H. RUSSEL, *Atlas*, Nottingham.
A. W. SNEATH, *Hand-in-Hand*, Leeds.
H. E. SOUTHAM, *Ocean*, London.
C. M. TATE, *Ocean*, Leeds.
A. GIBBON THOMSON, *Life and Health*, Edinburgh.

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

LIST OF SUBSCRIBING OFFICES, 1903.

ALLIANCE ASSURANCE COMPANY, LIMITED.
ATLAS ASSURANCE COMPANY, LIMITED.
CALEDONIAN INSURANCE COMPANY.
COUNTY FIRE OFFICE.
FRIENDS' PROVIDENT INSTITUTION.
GUARDIAN ASSURANCE COMPANY, LIMITED.
HAND-IN-HAND INSURANCE SOCIETY.
LIVERPOOL & LONDON & GLOBE INSURANCE COMPANY.
LONDON & LANCASHIRE FIRE INSURANCE COMPANY.
MANCHESTER ASSURANCE COMPANY.
NETHERLANDS FIRE & LIFE INSURANCE COMPANY.
NORTH BRITISH & MERCANTILE INSURANCE COMPANY.
NORTHERN ASSURANCE COMPANY.
NORWICH UNION FIRE INSURANCE SOCIETY.
PHOENIX ASSURANCE COMPANY, LIMITED.
PRUDENTIAL ASSURANCE COMPANY, LIMITED.
ROYAL INSURANCE COMPANY.
SUN INSURANCE COMPANY (FIRE).
UNION ASSURANCE SOCIETY.
YORKSHIRE INSURANCE COMPANY.

THE TREASURER IN ACCOUNT WITH

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND

FOR TWELVE MONTHS ENDING DECEMBER 31st, 1903.				Gt.	
Dr.					
To Balance from last Account	...	...	£141 11 6		
„ Journal Sales—					
Institutes	...	...	£162 19 8		
C. & E. Layton	...	...	33 17 1		
Sundry Sales	...	...	26 4 10		
„ Examinations—			223 1 7		
Entrance Fees	...	...	34 4 0		
„ Contributions—					
Insurance Companies	...	...	£98 0 0		
Institute Levies	...	...	44 5 0		
„ Bank Interest	...	...	3 12 2		
			<u>£544 14 3</u>		
By Journals—					
Printing Volume V.	...	...			£227 13 3
„ Examinations—					
Printing and Stationery	...	...			39 16 1
„ General Expenses—					
Secretary's Salary	...	...		£42 10 0	
Allowance for Office Expenses	...	...		15 0 0	
Postages and Petty Cash	...	...		14 5 2	
Printing and Stationery	...	...		12 12 6	
„ Balance—					84 7 8
Due by C. & E. Layton	...	...		7 12 5	
Cash in Bank	...	...		185 3 10	
Cash in Hand	...	...		0 1 0	
					<u>192 17 3</u>
					<u>£544 14 3</u>

Manchester, 3rd June, 1904.

Audited and found correct.

G. L. LAMBERT, } Auditors.
R. McCONNELL, }

THOS. A. BENTLEY, Hon. Treasurer.

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

THE BIRMINGHAM INSURANCE INSTITUTE.

Founded 1887.

Objects: (1st) The reading of papers and delivering of lectures by members, or experts who are not members, upon subjects connected with Insurance business generally. (2nd) The discussion of all questions relating to such business. (3rd) The promotion of social intercourse amongst members of the profession in Birmingham and district.

Ordinary General Meetings are held on the last Friday in each month from October to March, both inclusive. The Annual General Meeting is held at the beginning of each Session.

PRESIDENT—A. E. Patrick, *Westminster.*

VICE-PRESIDENTS—A. J. Lewis, *Sun Fire*; T. W. Jamieson, *North British and Mercantile.*

COUNCIL—J. Headon Boocock, *Commercial Union*; C. D. Butler, *Royal Exchange*; C. V. K. Morris, *Northern*; H. Cowan, *Union*; E. Brooke, *Guardian*; W. A. F. Bayley, *Liverpool and London and Globe*; C. E. Dudley, *Sun Fire.*

HON. TREASURER—John Foulkes, *Commercial Union.*

LIBRARIAN—F. C. W. Cox, *Sun Fire.*

HON. SECRETARY—C. F. Carson, *Patriotic*, 3 Waterloo Street.

THE INSURANCE INSTITUTE OF BRISTOL.

Founded 1890.

Objects: Social intercourse amongst members and the cultivation of knowledge on Insurance subjects.

PRESIDENT—J. Mason Guttridge, *M.I.E.E., Alliance.*

VICE-PRESIDENTS—B. A. Cater, *North British and Mercantile*; W. Blair, *Northern*; G. C. Glasson, *Economic Life*; J. Y. Crowe, *National Provident*; A. F. Tooke, *Westminster.*

PAST PRESIDENTS—Albert D. Brookes, *Alliance*; Henry L. Riseley, *Commercial Union*; S. G. Moxey, *Prudential*; W. Wilkes Woodhill, *Commercial Union*; Grahame H. Wills, James Bolton, *Union.*

COMMITTEE—J. Gibbs, *Phoenix*; S. W. Pullen, *Commercial Union*; H. M. Shellard, *Hand-in-Hand*; H. E. B. Harris, *Union*; E. B. Croft James, *Northern*; R. Weeks, *Western.*

HON. TREASURER—W. Blair, *Northern.*

HON. SECRETARY—William Pearce Tapp, jun., *Sun Fire*, 47 Corn Street.

ASSISTANT HON. SECRETARY—H. W. Cary, *County.*

THE INSURANCE SOCIETY OF EDINBURGH.

Established 1901.

Objects: The cultivation of knowledge of Insurance business generally (excluding Actuarial, Mathematical, and other cognate subjects, these being already provided for by the Faculty of Actuaries); the formation of a Library of professional works for the use of Members and Associates; and the promotion of social intercourse among those connected with the Insurance profession.

PRESIDENT—David Paulin, F.F.A., F.R.S.E., *Scottish Life*.

VICE-PRESIDENTS—Philip R. D. MacLagan, F.F.A., F.R.S.E., *North British and Mercantile*; Henry Brown, *Century*; Walter A. Smith, F.F.A., *English and Scottish Law Life*; J. A. Cook, *Scottish Union and National*.

PAST PRESIDENT—David Deuchar, F.F.A., F.I.A., F.R.S.E., *Caledonian*.

COUNCIL—M. Plenderleith, *North British and Mercantile*; James Cowan, *Caledonian*; Wm. Lee, *Scottish Union and National*; Alex. Dick, *Northern*; D. M. D. Yule, *Scottish Union and National*; W. J. M. Rennie, F.F.A., *North British and Mercantile*; James Learmont, *Caledonian*; George Turnbull, *Royal Exchange*; A. D. L. Turnbull, F.F.A., C.A., *Scottish Widows*; R. Cumming, B.A., *Scottish County and Mercantile*; D. Waugh, *Sun Fire*; H. Armour, *Scottish Accident*.

TREASURER—D. M. Cameron, *Alliance*.

SECRETARY—Robert Taylor, *Liverpool and London and Globe*, 23 St. Andrew Square.

THE INSURANCE AND ACTUARIAL SOCIETY OF GLASGOW.

Founded 1881.

Objects: (1st) The promotion of the study of the principles of Fire and Life Assurance, and of Assurance against other contingencies. (2nd) The consideration of all subjects to which the doctrines of probabilities may be applied, as well as the best methods of collecting and applying statistics. (3rd) The consideration of questions bearing on social science or political economy. (4th) The formation of a Library of professional works for the use of Members.

PRESIDENT—Arch. Blair, *London and Lancashire Fire*.

VICE-PRESIDENTS N. B. Gunn, F.F.A., F.I.A., *Scottish Amicable Life*; James Stirling, F.F.A., *Scottish Imperial*.

COMMITTEE—A. M. Clydesdale, *Norwich Union Fire*; Thomas Watson, *Scottish Widows*; John Robertson, *Northern*; J. B. Black, *Liverpool and London and Globe*; James Beattie, *Ocean Accident*; William King, *City of Glasgow Life*; David L. Laidlaw, *North British and Mercantile*.

HON. TREASURER—W. C. Rankin, *Royal*.

AUDITOR—W. W. Naismith, *County Fire*.

HON. SECRETARY—Stewart Lawrie, *Alliance*, 151 West George Street.

THE INSURANCE INSTITUTE OF IRELAND, DUBLIN.

Founded 1885.

Objects: (1st) The promotion of the study of the principles of Fire and

Life Assurance, and of Assurance against other contingencies. (2nd) The consideration of all subjects to which the doctrine of probabilities may be applied, as well as the best methods of collecting and applying statistics. (3rd) An organisation for any purpose necessary for the requirements of the profession. (4th) The promotion of a good understanding amongst the members of the Insurance profession in Ireland.

PRESIDENT—Henry C. Poulter, *Yorkshire*.

VICE-PRESIDENTS—C. Chevallier Cream, *National of Ireland*; B. H. O'Reilly, *Patriotic*; Caryl W. Fiennes, *Norwich Union*.

COUNCIL—J. C. Anderson, *Commercial Union*; E. Tenison Collins, *North British and Mercantile*; Wm. Coote, *Sun Fire*; T. M. A. Nolan, *London and Lancashire*; W. P. Sherriff, *Northern*; Thomas Speedy, *Union*; R. Y. Murray Wright, *Royal*; J. J. Acason, *National of Ireland*; C. E. Howell, B.A., LL.D., *Standard*; W. S. Kinnear, B.A., *Royal Exchange*; W. R. McNab, *Guardian*; George F. Sparrow, *London and Lancashire*.

HON. LIBRARIAN—Pat. B. Carphin, *Sun*.

HON. SECRETARY AND TREASURER—William A. McConnell, *Caledonian*, 31 Dame Street.

THE INSURANCE INSTITUTE, MANCHESTER.

Founded 1873.

PRESIDENT—G. L. Lambert, *North British and Mercantile*.

VICE-PRESIDENTS—R. McConnell, *Royal*; James Ostler, *Northern*; T. A. Bentley, *London and Lancashire Fire*.

COUNCIL—J. B. Cairnie, *Liverpool and London and Globe*; H. D. Curnick, *Norwich Union*; W. Hartley, *London and Lancashire*; T. Brand Miller, *Guardian*; A. Macniven, *Sun Life*; T. B. Sherwood, *Patriotic*.

HON. TREASURER—Charles Hobbins, *Rock*.

HON. LIBRARIAN—T. B. Sherwood, *Patriotic*.

HON. SECRETARY—H. M. Bentley, *Western Assurance Company*, 100 King Street.

THE INSURANCE ASSOCIATION OF MANCHESTER.

Founded 1883.

Objects: To encourage the delivery of essays and lectures upon subjects connected with Insurance, and discussion thereon; to organise visits of inspection to such risks as the Committee of Management may decide upon; and to promote social intercourse amongst those connected with Insurance Companies.

PRESIDENT—A. Macniven, *Sun Life*.

VICE-PRESIDENTS—T. Brand Miller, *Guardian*; W. H. Hoyle, *Westminster Fire*; Walter E. Jones, *Northern Accident*.

COMMITTEE—W. E. Astley, *Guardian*; J. D. Brocklehurst, *Assessor*; W. O. Coates, *Liverpool and London and Globe*; A. H. Coombes, *Royal*; H. Dawson, *Atlas*; J. E. Jones, *Sun Fire*; W. C. N. Lane, *Royal*; B. F. Shattock, *Guardian*; W. Sherwood, *Norwich Union*; A. E. Vickors, *National of Ireland*; W. Hy. Williams, *North British and Mercantile*; P. G. Wood, *Ocean Accident*.

HON. TREASURER—A. M. Allen, *Liverpool and London and Globe*.

HON. SECRETARY—H. C. Chambers, 16 John Dalton Street, Manchester.

THE INSURANCE INSTITUTE OF NEWCASTLE-ON-TYNE.

Founded 1896.

The objects of the Institute shall be the promotion and cultivation of a thorough knowledge of Insurance business by means of the reading of papers, the delivery of lectures upon subjects connected therewith, the discussion of questions relating thereto, the formation of a Library, the inspection of risks and in any other way which may be deemed desirable, and generally the promotion of social intercourse amongst the members.

PRESIDENT—J. S. Waterstone, *Royal Exchange.*

VICE-PRESIDENTS—H. P. Blunt, *Royal*; J. G. Ogilvie, *Caledonian*; F. W. Panton, *Norwich Union Fire*; C. Shutt, *County and Provident.*

PAST PRESIDENTS—James Logan, sen., *North British and Mercantile*; R. A. Wood, *Liverpool and London and Globe*; Sir Riley Lord, *Prudential*; John G. Boss, *Royal*; H. Allan de Buriatte, *Law Accident*; James Logan, jun., *North British and Mercantile*; James Hopper, *Sun.*

COMMITTEE—J. H. Burgess, *Northern*; D. C. Campbell, *Commercial Union*; A. B. Chapman, *London and Lancashire Fire*; J. R. Liddell, *Royal*; T. P. Lloyd, *Northern*; T. H. Watson, *Law Accident*; F. F. Worthington, *Union.*

HON. LIBRARIAN—H. P. Blunt, *Royal.*

HON. TREASURER—H. A. Brownfoot, *Scottish Equitable.*

HON. SECRETARY—J. H. Chapman, *Norwich Union Fire*, 1 Mosley Street.

THE NORWICH INSURANCE INSTITUTE.

Founded 1886.

PATRONS—Major F. Astley Cubitt, J.P.; S. Gurney Buxton, D.L., J.P.

PRESIDENT—C. A. Bathurst Bignold, D.L., J.P.

VICE-PRESIDENTS—W. P. Abel, *Norwich*; A. R. Andersson, *Liverpool*; J. H. Chapman, *Newcastle*; A. M. Clydesdale, *Glasgow*; J. F. Cubitt, *Bristol*; H. D. Curnick, *Manchester*; F. Dalton, *Birmingham*; J. J. W. Deuchar, *Norwich*; A. Dixon, *Toronto*; Caryl Fiennes, *Dublin*; Geo. Gibb, *Melbourne*; J. Montgomery Hare, *New York*; Henri de Heyn, *Paris*; J. B. Laidlaw, *Toronto*; John Large, *Norwich*; W. H. Lowden, *San Francisco*; Bruce Morison, *F.R.G.S., London*; C. E. Noverre, *F.R. Hist. S., London*; H. Panton, *Sunderland*; F. Oddin Taylor, *D.L., J.P., Norwich*; J. T. Ward, *Belfast*; Jas. Watson, *Leeds.*

TRUSTEES—W. P. Abel, J. de Caux, L. B. Fühl, F. O. Taylor.

COUNCILLORS—J. de Caux, W. J. Drane, G. E. Kirby. R. F. Mallett, J. B. Messent.

TREASURER—C. R. Quinton. **AUDITOR**—L. B. Fühl.

LIBRARIAN—W. T. Blazeby.

MICROSCOPIST AND PHOTOGRAPHER—W. Thouless.

CURATOR—G. O. Clark. **ASSISTANT CURATOR**—F. J. Hall.

HON. SECRETARY—J. Scott Cavell, 7 Surrey Street.

HON. ASSISTANT SECRETARY—J. P. Green, *Do.*

THE NOTTINGHAM INSURANCE INSTITUTE.

Established 1898.

Objects: The reading of papers and the delivery of lectures upon subjects connected with Insurance business generally, the discussion of all questions relating thereto, and the promotion of social intercourse amongst the members of the profession in Nottingham and district.

PRESIDENT—W. G. Neish, *Northern*.

VICE-PRESIDENT—J. W. Foster, *Scottish Accident*.

COUNCIL—E. A. Cotts, *North British and Mercantile*; A. Harwood, *County*; D. McMichael, *Commercial Union*; R. H. Russel, *Atlas*; L. J. Towle, *Atlas*.

HON. TREASURER—T. Mercer, *Guardian*.

HON. SECRETARY—T. B. Redgate, *North British and Mercantile*, 25 Victoria Street.

THE INSURANCE INSTITUTE OF YORKSHIRE, LEEDS.

Founded 1888.

Objects: The delivery of lectures on subjects connected with Insurance business, the discussion of questions relating thereto, and, generally, the promotion of social intercourse amongst the members of the Insurance profession in Yorkshire.

PRESIDENT—D. M. Linley, *British Law*.

VICE-PRESIDENTS—J. P. Eddison, *North British and Mercantile*; F. R. Hardingham, *F.S.S., Rock*; F. J. Allen, *Atlas*; A. H. Cowpe, *Royal*; W. Holbrook, *Royal*; H. Pocklington, *Commercial Union*.

PAST PRESIDENTS (*ex-officio* Members of Council)—T. S. Riley; J. Wardle, *Liverpool and London and Globe*; J. B. Roberts, *Sun Fire*; C. M. Tate, *Ocean Accident*; J. W. Wootton, *Sun Life*; P. L. Newman, *B.A., F.I.A., Yorkshire*.

COUNCIL—W. A. Bingham, *State*; T. Brown, *London and Lancashire Fire*; T. G. Brunskill, *Royal*; H. Cooke, *Liverpool and London and Globe*; F. Denton, *Sun Fire*; C. E. Fox, *London and Lancashire Fire*; G. Lithgow, *Sun Fire*; A. Moorhouse, *F.I.A., Friends' Provident*; G. A. Nairn, *Scottish Provident*; A. W. Sneath, *Hand-in-Hand*; H. R. Sutcliffe, *Phoenix*; W. Thorp, *Assessor*.

HON. TREASURER—W. Riley, *Westminster*, 28 East Parade, Leeds

HON. AUDITORS—F. Atterton, *Atlas*; F. Bingham, *British Law*.

HON. LIBRARIAN—W. A. Holroyd, *Sun Fire*, 15 Park Row, Leeds.

HON. SECRETARY—E. Bagshaw, *Phoenix*, 8 Park Row, Leeds.

INSTITUTES AFFILIATED WITH THE FEDERATION.

THE INSURANCE INSTITUTE OF MONTREAL.

Founded May 1900.

HONORARY PRESIDENT—The Right Honourable Lord Strathcona and Mount Royal, G.C.M.G.

PRESIDENT—T. L. Morrissey, *Union*.

VICE-PRESIDENTS—T. B. Macaulay, *Sun Life*; H. M. Lambert, *Guardian*.

PAST PRESIDENTS—W. M. Ramsay, *Standard Life*; G. F. C. Smith, *Liverpool and London and Globe*; B. Hal Brown, F.S.S., *London and Lancashire Fire*; E. P. Heaton, *Guardian*.

MEMBERS OF COUNCIL—J. G. Thompson, *Liverpool and London and Globe*; D. McGoun, *Standard*; A. H. Lavers, *Aetna Life*; A. R. Howell, *Royal Life*; R. J. Dale, *Dale & Co.*; T. F. Dobbin, *London and Lancashire Fire*; A. B. Wood, *Sun Life*; J. B. Paterson, *Phoenix of London*; W. B. Colley, *London Assurance*; Lansing Lewis, *Caledonian*.

HON. TREASURER—Charles C. Hole, *Royal Victoria Life*.

HON. SECRETARY—George Lyman, *Norwich Union*, Temple Buildings, St. James Street.

INSTITUTE ROOMS—Inglis Building, 2381 St. Catherine Street.

THE INSURANCE INSTITUTE OF NEW ZEALAND, WELLINGTON.

Established 1899.

PRESIDENT—Mortis Fox, *Government Life*.

VICE-PRESIDENT—A. E. Kernot, *Australian Alliance*.

COMMITTEE—A. E. Gibbs, *Colonial Mutual Life*; H. L. Levestam, *Government Life*; C. M. Montefioul, *Ocean Accident*; C. D. Morpeth; G. T. Mason, *London and Lancashire*; T. W. Pilcher, *Manchester Fire*; Sortain Smith, *Government Life*; J. Wishart, *Australian Mutual Provident*.

HON. AUDITOR—C. Brooke-Taylor, *South British*.

HON. SECRETARY AND TREASURER—Wilfrid Skegg, *Alliance*.

THE INSURANCE INSTITUTE OF SOUTH AFRICA, CAPE TOWN.

PRESIDENT—William Hay, *Liverpool and London and Globe*.

VICE-PRESIDENT—C. Worroll, *Colonial Mutual*.

MEMBERS OF COUNCIL—William Elliott, *Southern Life*; W. Wilson, *New Zealand*; A. C. F. Gore, *Guardian*; John Robb, *South African Mutual*; R. H. Mitchell, *Southern Life*; R. Y. Sketch, *Ocean*; A. H. Bullen, *Star*.

HON. SECRETARY AND TREASURER—William Mathieson, 119 Longmarket Street.

THE INSURANCE INSTITUTE OF TORONTO.

Founded 1899.

PRESIDENT—Frank Sanderson, M.A., F.F.A., *Canada Life*.

VICE-PRESIDENT—C. C. Foster, *Western*.

CURATOR—J. K. Pickett, *Imperial Life*; **ASSISTANT CURATOR**—H. W. Crossin, *Canadian Fire Underwriters*.

TREASURER—D. E. Kilgour, M.A., A.I.A., *North American Life*.

GENERAL SECRETARY—S. R. Tarr, M.A., *Canada Life*, 27 and 29 Wellington Street, East.

COUNCIL—A. E. Blogg, *London and Lancashire Fire*; T. Bradshaw, F.I.A., *Imperial Life*; C. R. Fitzgerald, B.A., A.I.A., *Home Life*; C. H. Fuller, *Continental Life*; J. B. Laidlaw, *Norwich Union Fire*; F. J. Lightbourn, *Ontario Accident*; J. K. Macdonald, *Confederation Life*; J. Maughan, *Hartford*; P. C. H. Papps, A.I.A., *Manufacturers' Life*; G. H. Roberts, *Crown Life*; H. A. Sherrard, *Western*; P. H. Sims, *British America*; E. Willans, *Dominion of Canada Guarantee and Accident*.

EXECUTIVE COMMITTEE—F. Sanderson, M.A., F.F.A., *Canada Life*; C. C. Foster, *Western*; S. R. Tarr, M.A., *Canada Life*; D. E. Kilgour, M.A., A.I.A., *North American Life*; J. B. Laidlaw, *Norwich Union Fire*; J. K. Pickett, *Imperial Life*.

EDUCATIONAL COMMITTEE—F. Sanderson, M.A., F.F.A., *Canada Life* (Convener); C. C. Foster, *Western*; T. Bradshaw, F.I.A., *Imperial Life*; J. B. Laidlaw, *Norwich Union Fire*.

DEBATES COMMITTEE—W. H. Hall, *American Surety* (Convener); J. B. Hall, A.I.A., *Imperial Life*; A. H. Rodgers, *Norwich Union Fire*; L. A. Winter, *Manufacturers' Life*.

ENTERTAINMENT COMMITTEE—H. A. Sherrard, *Western* (Convener); R. Junkin, *Manufacturers' Life*; E. Marshall, *Excelsior Life*; J. A. Shaw, *Norwich Union Fire*.

INSURANCE CLERKS' ORPHANAGE.

Object: To maintain and educate orphan or necessitous children of Clerks and Officials of Insurance Companies who were Members of the Orphanage by placing such children at selected schools, and making money grants for their clothing, between the ages of 6 and 16.

Members and Subscribers may commence their Annual Subscriptions on any one of the following dates, viz.:—1st February, 1st May, 1st August, or 1st November, and all future Subscriptions will be due on the date so selected.

NOTE.—5s. annually qualifies for Membership. £3 3s. in one sum qualifies for a Life Membership.

PRESIDENT—The Right Honourable Lord Rothschild, G.C.V.O.

VICE-PRESIDENTS—The Right Hon. Lord Avebury, F.R.S., D.C.L., LL.D., Director, *Phoenix Fire*, *Pelican and British Empire Life*, and *British and Foreign Marine*; S. A. Beaumont, Managing Director, *County Fire and Provident Life*; George H. Burnett, Hampstead; John Coles, Chairman, *Clerical, Medical and General Life*; Sir F. D. Dixon-Hartland, Bart., M.P., Director, *The Westminster Fire and Westminster and General Life*; C. G. Fothergill, Director, *London and Lancashire Fire*; H. Ernst Hall, Chairman, *Fire Offices' Committee*; Robert Lewis, *Alliance*, Marlborough R. Pryor, Director, *Sun Fire*.

CHAIRMAN—Saml. J. Pipkin, *Atlas*.

DEPUTY-CHAIRMAN—E. H. Holt, *Law Life*.

OFFICE—11 Queen Street, Cheapside, London.

SECRETARY—R. C. Cole.



THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

THE Eighth Annual Conference was held at the Caledonian Station Hotel, Edinburgh, on Friday, 10th June, 1904, on the invitation of the Insurance Society of Edinburgh. Mr. David Deuchar, F.F.A., F.I.A., F.R.S.E. (General Manager and Actuary, Caledonian Insurance Co.), the President of the Federation, occupied the chair, and there were present:—

Past Presidents—JOHN G. BOSS (Royal); JAMES OSTLER (Northern); and DAVID L. LAIDLAW (North British and Mercantile).

Hon. Treasurer—THOMAS A. BENTLEY (London and Lancashire), Manchester.

Hon. Secretary to the Examiners—A. W. SNEATH (Hand-in-Hand), Leeds.

Hon. Secretary to the Publications Sub-Committee—HENRY G. ANDREWES (Scottish Union and National), Glasgow.

Hon. Secretary to the Insurance Society of Edinburgh—ROBERT TAYLOR (Liverpool and London and Globe), Edinburgh.

Examiners—CHARLES D. BUTLER (Royal Exchange), A. S. FRASER (Commercial Union), and WILLIAM HOLBROOK (Royal).

Secretary to the Federation—CHARLES STEVENSON, Manchester; and the following delegates:—

BIRMINGHAM	-	-	-	A. J. LEWIS (<i>Sun</i>), Ex-President. A. E. PATRICK (<i>Westminster</i>). A. R. WINN (<i>Yorkshire</i>), Hon. Treasurer.
BRISTOL	-	-	-	J. MASON GUTTRIDGE (<i>Alliance</i>), President. W. BLAIR (<i>Northern</i>), Hon. Treasurer.
EDINBURGH	-	-	-	DAVID PAULIN, F.F.A., F.R.S.E. (<i>Scottish Life</i>), President.

		HARRY ARMOUR (<i>Scottish Accident Life, and Fidelity</i>).
		D. M. CAMERON (<i>Alliance</i>), Treasurer.
GLASGOW - - -	-	ARCH. BLAIR (<i>London and Lancashire</i>), President.
		STEWART LAWRIE (<i>Alliance</i>), Hon. Secretary.
IRELAND - - -	-	HENRY C. POULTER (<i>Yorkshire</i>), President.
		S. G. ROBINSON (<i>Standard</i>).
		W. A. McCONNELL (<i>Caledonian</i>), Hon. Secretary.
MANCHESTER INSTITUTE -	-	G. L. LAMBERT (<i>North British and Mercantile</i>), President.
		J. B. CAIRNIE (<i>Liverpool and London and Globe</i>).
		CHAS. HOBBS (<i>Rock</i>).
MANCHESTER ASSOCIATION -	-	A. MACNIVEN (<i>Sun Life</i>), President.
		T. BRAND MILLER (<i>Guardian</i>), Vice-President.
NEWCASTLE-ON-TYNE -	-	J. S. WATERSTONE (<i>Royal Exchange</i>), President.
		C. SHUTT (<i>County and Provident</i>), Vice-President.
		J. H. CHAPMAN (<i>Norwich Union</i>), Hon. Secretary.
NORWICH - - -	-	A. M. CLYDESDALE (<i>Norwich Union Fire</i>), Glasgow, Vice-President.
		WM. RICHARDSON (<i>Norwich Union Fire</i>), Edinburgh.
NOTTINGHAM - - -	-	W. G. NEISH (<i>Northern</i>), President.
		J. W. FOSTER (<i>Scottish Accident</i>), Vice-President.
		J. L. TOWLE (<i>Manchester</i>).
YORKSHIRE - - -	-	PHILIP L. NEWMAN, B.A., F.I.A. (<i>Yorkshire</i>), York.
		A. MOORHOUSE, F.I.A. (<i>Friends' Provident</i>), Bradford.

Apologies were received from:—

Past Presidents—F. Dalton (*Norwich Union*), Birmingham; S. G. Moxey (*Prudential*), Bristol; and Bernard H. O'Reilly (Manager, *Patriotic*), Dublin.

Hon. Secretary to the Examiners—J. P. Eddison (*North British and Mercantile*), Leeds.

Delegates—Bristol, Grahame H. Wills, Ex-President; and J. Headon Boocock (*Commercial Union*), Birmingham.

Examiners—Samuel Butler (*London and Lancashire*), Newcastle-on-Tyne; H. D. Curnick (*Norwich Union Fire*), Manchester; C. E. Fox (*London and Lancashire*), Leeds; James Gemmell (*Royal Exchange*), Glasgow; C. H. Green (*Sun Life*), London; N. B. Gunn, F.F.A., F.I.A. (*Scottish Amicable*), Glasgow; James Haslam (*Ocean*), Nottingham; C. E. Howell, LL.D. (*Standard*), Dublin; Owen D. Jones (*London and Lancashire Fire*), Leeds; W. S. Kinnear (*Royal Exchange*), Dublin; Robert McConnell (*Royal*), Manchester; H. Pocklington (*Commercial Union*), Leeds; J. B. Roberts (*Sun*), Leeds; R. H. Russel (*Scottish Union and National*), Nottingham; H. E. Southam (*Ocean*), London; C. M. Tate (*Ocean*), Leeds.

Orphanage—Albert D. Brookes (*Alliance*).

After the adoption of the minutes of last Conference, the Secretary read the Report of Executive Committee, 1904.

SECRETARY'S REPORT, 1904.

The record of the past year is one of continued progress in every department.

The Journal, of which the sixth volume was issued in December last, maintains the high character of its predecessors. The subjects dealt with in the various papers are selected with care, and every year's issue adds to the value of this repository of many of the best and most useful of the papers read before the local Institutes. This year's volume contains twenty papers, of which eleven deal with fire insurance, three with life (two legal), four are medical, and two general papers. An index has been added, giving all the subjects contributed in former volumes, thus adding to the value of the Journal for purposes of reference. The Constitution and Bye-laws, which were adopted at last year's Conference, are also included in the Journal.

The Annual Examinations were held in the last two weeks of April, and it is pleasing to record that the number of entries was larger than in any previous year. They were held in all the ten Institute centres, also in London, Leicester, York, Perth, Dundee, Hull, and Sheffield where the Federa-

tion is not represented. For their kindness in placing rooms at the disposal of the Federation, and for their presence at the examinations as presiding officers, acknowledgment is due to the officials in London of the Hand-in-Hand, Dundee of the Commercial Union, Hull of the Yorkshire, Leicester of the Hand-in-Hand, Perth of the General Accident, Sheffield of the Alliance, and York of the Yorkshire.

The question of examinations in the Colonies has continued to engage the attention of the Executive during the year, and while it has not been possible as yet to complete the scheme so as to deal equitably with the varying conditions as regards the practice of insurance, tariffs, &c., ruling in the separate Colonies, the negotiations are in a forward state, and it is hoped that by next April all the four affiliated Institutes will be able to co-operate. Meanwhile, it is most gratifying to report that both Toronto and Cape Town have been able to join in the examinations this year, 49 candidates having given in their names from Toronto and 28 from Cape Town.

The new educational feature of the year is the offer by the Federation of a prize of £10 10s. for the best essay on "The Theory and Practice of Fire Insurance Business." The conditions were carefully prepared and widely circulated, with the result that nineteen essays were sent in. These were of great merit, and the report and adjudication of the judges will be presented to the Conference, after which the sealed envelopes containing the names of the writers will be opened and the names announced.*

The Treasurer's Statement for the year shows that the total receipts were £403 2s. 9d., and the expenditure £351 17s., showing a balance of receipts over expenditure of £51 5s. 9d., as compared with £38 18s. 7d. in the previous year. The Executive take this opportunity of thanking the contributing Offices and subscribers for their valuable financial assistance.

The lamented death, on 19th January last, of Mr. J. B. Tennant, our third President, must be recorded with profound

* See President's Address, page xxvii., and footnote giving the names of the successful competitors.

sorrow. His uniformly kind and courteous manner, and his self-denying and painstaking labours in the interests of the Federation, had endeared him to all who had the privilege of meeting him at the annual meetings of the Conference or in Committee, and his decease will leave a painful sense of loss to all those who have been associated with him in past years.

The Insurance Clerks' Orphanage has completed its second year, and the Report to be submitted shows that 2304 members are now enrolled, that three orphans are already on the fund, and that the reserve of capital has been materially increased, and amounts, with the balance of revenue, to £7503 2s. 2d. It is very gratifying to record the liberal and spontaneous support given to this scheme by many head offices and Insurance officials.

The Executive desire to record their thanks to all who have contributed to the prosperity of the Federation during the past year; to the President for his genial and courteous guidance of the affairs of the Federation; to the Examiners and their two Honorary Secretaries for the enormous labours in their department, so generously and ungrudgingly given; to the Publication Sub-Committee for their valuable work in editing the Journal and seeing it through the press; to the gentlemen who so kindly undertook to adjudicate on the prize essay; and to the Honorary Treasurer for his close attention to the finances of the Federation.

On the motion of the President, it was decided that a resolution of condolence be sent to Miss Tennant expressing the profound sorrow of the members of Conference at the death of Mr. J. B. Tennant, the third President of the Federation.

The PRESIDENT—Mr. David Deuchar—then addressed the Conference as follows:—Gentlemen,—It now becomes my duty, in accordance with precedent, to deliver something in the shape of an address; and as I have the greatest possible respect for precedent, I shall endeavour to fulfil this duty in a sort of way. I have, however, considerable doubt as to

whether an address, sandwiched between items of serious business, is really calculated to be of use at such a meeting as this, and I feel still greater doubt as to whether the few remarks which I propose to lay before you will be regarded as in any way worthy of being dignified with the name of an address.

My remarks, such as they are, will be grouped under the following heads, namely:—

- (1) Edinburgh as an insurance centre.
- (2) The difficulties which are met with in starting an insurance society in a place situated as Edinburgh is, and the way in which these difficulties were ultimately overcome.
- (3) The work of the Federation, and the question as to whether the life examinations should be continued on their present footing, or should be modified or abandoned.
- (4) The lessons to be drawn from recent occurrences in fire insurance business.

Most people are familiar, through the writings of Sir Walter Scott, with the romantic features of Edinburgh and its historical associations; but probably there are many insurance men, and possibly some delegates to this Conference, who are imperfectly acquainted with the position occupied by Edinburgh in insurance business. So far as life assurance is concerned, that position is a very prominent one, as the life business of the companies whose head offices are situated in Edinburgh ranks second in volume to that of the London offices. In fire insurance the Edinburgh companies do not occupy quite so prominent a position, but they rank third in volume of business, the second place being taken by the Liverpool companies, and the first, as in life, being taken by the London companies.

There are no fewer than nineteen head offices of insurance companies in Edinburgh. Of these companies, fourteen transact life business, seven doing that class of business alone, three doing life business in combination with fire, and four doing life business in conjunction with accident or sickness insurance. Of the remaining five companies, one transacts

fire business alone, one does fire business in connection with burglary and plate-glass insurance, one transacts fidelity business alone, and one transacts insurance against loss of keys, accident, and disease.

The fourteen companies transacting life assurance business have life assurance funds amounting collectively to £72,835,778, or more than one-fourth of the total life assurance funds as reported to the Board of Trade by the eighty-two companies transacting ordinary life assurance business, a position somewhat remarkable when the small population of Edinburgh is taken into account.

Of course, as a field for agency work, either in fire or life business, Edinburgh cannot bear comparison with the great manufacturing and mercantile centres. This is especially noteworthy in connection with fire insurance; but I think, nevertheless, that Edinburgh is not altogether a bad school to select for acquiring a knowledge of fire business, if the young student can obtain a clerkship in a branch office, which, in the fire department, is always to be preferred as affording more opportunities for seeing outside work and for obtaining a general grasp of the business than can be got in a head office.

While, as everyone knows, Edinburgh is not a great manufacturing or mercantile city, there are some departments of manufacture and trade (such as paper-making, and making of paper-mill machinery, printing and envelope-making, brewing, distillery, biscuit baking, rubber and vulcanite works) in which it occupies a fairly prominent position; and the district contains a respectable number of samples of other classes of risk, including collieries, and the various storage and other risks at Leith. To the young fire insurance men, Edinburgh therefore affords opportunities of learning the business which, taken as a whole, are perhaps as good as those to be got in most other places, unless perhaps in Glasgow, Manchester, or London.

Edinburgh has been known as an insurance centre for eighty or ninety years, but it had no insurance society on the lines of those embraced in our Federation until three

years ago, while Manchester has had one for thirty-two years, Glasgow has had one for twenty-four years, and Dublin, Birmingham, Bristol, Leeds, Newcastle-on-Tyne, and Nottingham all have had similar societies for considerable periods. This may appear strange, but it is even more remarkable that London, the greatest city in the world, and the original home of insurance, has not yet even succeeded in establishing an insurance society. In 1888 a serious attempt was made to found one in London, but leading members of the Institute of Actuaries thought that unless the new society were restricted to fire and accident insurance it would seriously interfere with their own body, and some prominent fire insurance managers had a similar fear as to its conflicting with the interests of the Fire Offices' Committee. As the result, the enthusiasm of the movers in the matter was chilled, and the attempt was abandoned.

When a little thought is given to the matter it is seen to be only natural that obstacles to the establishment of a society of this kind should be found in cities which are the homes of such great professional and trade organisations as the Institute of Actuaries, the Faculty of Actuaries, the Fire Offices' Committee, the Association of Life Managers in Scotland, and the Life Offices' Association, London. In Manchester, Glasgow, Dublin, Birmingham, Leeds, and other centres the obstacles were as a rule non-existent. There were few or no head offices, and many branch offices. There were thus many active men occupying more or less independent positions, and able to take the initiative in a local movement of the kind. There was no existing local association of managers, fire or life, and no local scientific body such as the Institute or Faculty of Actuaries; and it did not occur to anyone in these great provincial centres that the establishment of a local insurance society could interfere with the work of any dignified body located in London or Edinburgh. Hence in these centres insurance societies were established with little or no difficulty.

In Edinburgh we were confronted with a totally different position, and we had to walk warily. As a measure of

prudence, and because we regarded the matter as right in itself, we passed a resolution excluding absolutely from the objects of our local society everything coming within the scope of the work of the Faculty of Actuaries. By this means we succeeded in demonstrating to the Faculty that our society could in no way come into collision with their work. Having satisfied them on this point, we secured their friendly assistance, and we have enjoyed from the start the great privilege of obtaining free of charge the use of the hall of the Faculty for our meetings.

I would now refer very briefly to the work of the Federation. Of what is being done outside our own society I have only a general knowledge; but I think it is a fair inference from what has come under my observation in one or two other societies that all along the line, in the case of the societies in the United Kingdom which belong to the Federation, work is being done of a similar kind to that which is carried on in the Edinburgh society. And if this be so, I feel the very greatest confidence in saying that the work done is of a very valuable character. I cannot speak too highly of the self-denying labours of Mr. Taylor, Mr. Cameron, and other earnest and indefatigable workers in our own society in conducting classes, in arranging for inspection of fire risks, in obtaining new members, in reading papers, in getting others to assist in these directions, and, I feel bound in honesty to add, in supplying the many deficiencies of the local President.

There is one point in connection with the life examinations now being carried on by the Federation which, I think, I ought to refer to here, although it will come up for consideration later on in the proceedings of this Conference. The Examiners, or some of them, seem to have had doubts for some time as to the advisability of continuing the life examinations. The matter was referred to at the Newcastle Conference, and since then I have given a good deal of consideration to it, and have come to the conclusion, so far as my individual judgment is concerned, that if they are continued the scope of examination should be modified, and

everything mathematical or actuarial should be excluded. At the request of the Secretary to the Federation, who had been in communication with the Examiners on the subject, I wrote to Mr. J. B. Tennant on the point. This was a short time before his lamented death. He had strongly deprecated the proposal to discontinue the life examinations, and this view he maintained in the correspondence which I shall read to you. You will see, however, that he admitted that the examinations were too ambitious at the outset, and seemed to approach too near to those of the Institute of Actuaries and Faculty of Actuaries; but, as subsequently modified, he considered they were free from this objection, although he would be willing to consent to any further modification so as to make it absolutely clear that there was no intention of trespassing on the ground occupied by the Institute and Faculty. He admitted, too, that, from a practical point of view, the life examinations had not taken hold, and might have to be discontinued on the ground simply of lack of candidates, but he urged that they might be tried for a year or two longer, as he thought that they might prove of great benefit to the ordinary intelligent clerk who had no mathematical or actuarial aspirations, but who looked forward to such a position as a branch managership, and who required practical rather than theoretical instruction on life topics.

[Mr. Deuchar at this stage read the whole correspondence with Mr. Tennant, stating that he considered it due to the Conference to let them have Mr. Tennant's views in full, as it was evident that he had given much thought to the matter.]

You will remember that at the Conference last year it was resolved to offer a prize for an essay on a subject to be afterwards selected. The subject ultimately fixed upon and announced was "The Theory and Practice of Fire Insurance Business," and the adjudication was left in the hands of two past Presidents, Mr. Laidlaw and Mr. Ostler, and myself. Nineteen essays were sent in, and more than a dozen of these showed very decided merit. After long and careful consideration the judges came to the conclusion that two of the essays,

one bearing the motto *Palma non sine pulvere*, and the other bearing the motto *Onward*, were conspicuously above the others, and were so nearly equal that it would not be satisfactory to place one above the other. Accordingly these essays had been bracketed by the judges as equal. A third essay, bearing the motto *Uberrima fides*, which treated the subject from a legal point of view, was considered by the judges to be deserving of honourable mention. As yet the sealed envelopes containing the names of the writers of these three essays have not been opened; and I think it may perhaps be the wish of the Conference to consider, before they are opened, as to whether, in view of the high order of merit of the two essays adjudged equal and the terms of the wording of the conditions, any increase might with propriety be made in the amount of prize to be divided between these two competitors.*

In conclusion, I would refer briefly to certain recent events in fire insurance history—namely, the great conflagrations at Baltimore and Toronto, following within a comparatively short interval the conflagrations at Jacksonville and Ottawa, and certain destructive fires in London and elsewhere. These conflagrations emphasise and strengthen the lessons to be learned from such a paper as that by Mr. Goad, written some years ago, on the subject of the great fires of the preceding ten years, and from certain chapters in that most practical and valuable work of the great American underwriter, Mr. Moore, *Fire Insurance and How to Build*.

It seems to me that these great conflagrations may prove blessings in disguise if they lead to the complete separation of conflagration hazard from what may be termed ordinary

* The Conference resolved that on this occasion the prize be doubled, and that £10 be given to the writers of each of the two essays which were adjudged equal. The envelopes were then opened, when it was found that the two gentlemen who had tied for the first prize were Mr. P. B. CARPHIN, *Sun Fire Office*, Dublin (motto "*Palma non sine pulvere*"), and Mr. JOHN BURDUS REDFORD, *Sun Fire Office*, Newcastle-upon-Tyne (motto "*Onward*"); while an Honourable Mention was awarded to Mr. GEORGE W. REYNOLDS, *Guardian Assurance Company*, London (motto "*Uberrima fides*").

inherent and neighbouring hazard. If the premiums for conflagration hazard could be kept apart from those for ordinary risk, and could be carried direct to a conflagration fund out of which conflagration losses would fall to be paid, and if both conflagration premiums and conflagration losses could be kept out of the ordinary calculations for fixing percentages of loss ratio, one great element of disturbance would be got rid of, and there would be less tendency to start new companies on insufficient data. I venture to suggest that this important matter might form a worthy and appropriate subject for a paper by some senior member of the profession in the near future.

Gentlemen, this concludes what I have to say, and I have now only to thank you for having listened so patiently to these somewhat rambling remarks.

THE LATE MR. DAVID DEUCHAR.

To all connected with the Actuarial profession and the business of Insurance, the death of Mr. David Deuchar is a cause of very sincere regret. To some of us it is a personal sorrow, for he was our friend, and we prized and esteemed him as only friends can prize and esteem each other. It is, however, mainly as a man of business and affairs that we must speak of him here.

Of one whose father began life with a legal training, and afterwards turned his mind to scientific pursuits and became a lecturer on chemistry—whose grandfather was a connoisseur in art and produced etchings which are well known to this day, and was, moreover, of material assistance in starting the renowned Sir Henry Raeburn on his artistic career—and whose grandmother was a direct descendant of the still more renowned Baron Napier of Merchiston, the “inventor” of Logarithms—it would have been difficult to predict what ancestral bias would show itself in his own career. Given, however, a congenial pursuit and the requisite steadiness of character, it might have been confidently anticipated that he would “achieve somewhat.” The circumstances which directed him into the path of Insurance do not appear; but, fortunately for him and for the profession he was afterwards to adorn, that was the choice made. And if his choice of a profession was fortunate, his training ground was also happily chosen. At the time when the young David Deuchar had finished his school education, Mr. William Thomas Thomson of the Standard Life Office was, or was rapidly becoming, *facile princeps* among Insurance Managers. His clear grasp of business and finance, his reputation as an Actuary, the high ideals he entertained for his profession, and the warm personal interest he took in the training and progress of younger men—all these, combined with the air of personal distinction which surrounded him, and the tone and dignity he infused into ordinary affairs, made the Standard Office a veritable “school of the prophets.” Fortunate were the

young men who, having aptitude to learn and sense to profit by their opportunities, passed under Mr. Thomson's hands. Not only was their training good, but in those days the business of Insurance was just reaching a stage when it required the services of a new race of trained and skilled men, fit to share the responsibilities of their seniors and to assist in keeping the affairs of the Offices on a sound basis. To those who know the histories of men who have risen to prominent positions in Insurance Offices within the last thirty or forty years, the names will readily occur of not a few who came out of the Standard Office, and who owed their early promotion to the training and influence of Mr. Thomson. Among them was David Deuchar. He entered the "Standard" as an apprentice in 1858, at the age of 15; and at three-and-twenty, having passed the necessary examinations, he had qualified himself as a member of the Faculty of Actuaries, and was ready to take an official position. He was chosen as Assistant-Actuary to the Caledonian Insurance Company, but his duties, it appears, were not exclusively actuarial. They embraced the work of a "Life Superintendent," and presumably in that capacity Mr. Deuchar began to exercise the talent for Agency organisation which he was afterwards so conspicuously to display. In this he must have been greatly aided, all through his career, by a quality as valuable as it is uncommon, but which he possessed in a marked degree—the instinct for choosing men and for bringing out the best that is in them.

This appointment in the "Caledonian" lasted only three years, as a better opening occurred in the "Edinburgh Life," where he became Joint-Actuary, and afterwards Secretary, under Mr. David MacLagan. Here he had ample opportunity of developing his talents and gaining experience, not only as an Actuary but also in the working of a Branch and Agency system. The Company during his period of office greatly extended its organisation, and we have the best reason to know that he was of invaluable assistance in this direction.

In 1874 the Managership of his former Office, the "Caledonian," became vacant by the death of Mr. John Moinet. Judged by ordinary standards it would have seemed unsuitable to put at the head of a Fire and Life Office a young man—he was only 31—whose whole experience had been gained in the department of Life Insurance. The Directors, however, knew their man. They already had experience of his qualities, and they

were wise enough to perceive that what their Company needed at the time was one possessed of the capacity for developing a business, sound in itself, but cramped for want of sufficient enterprise. They appointed Mr. Deuchar, and the results have been what we all know. At the date of his appointment the whole yearly income of the Company was about £100,000, and its accumulated funds were little over £600,000. The growth of those sums to the present figures has all taken place under his management.

It was characteristic of the man that when he undertook his new responsibilities at the "Caledonian" he at once applied himself to acquire a thorough knowledge of Fire Insurance—the branch of the Company's business with which he was least familiar—not caring so much for clerky details as for the principles that should guide him, and enable him to guide others, in his administration. How quickly and with what success he grasped the subject can best be testified by those who met him among trained Fire Insurance men, and who saw him take up the duties of Honorary Secretary to the Scottish Fire Offices Committee within three or four years after beginning his career as a Fire Manager. Of his more matured knowledge and experience, some of the fruits will be found in the addresses delivered by him from time to time to various Insurance Institutes and Societies. The paper on "Fire Insurance Risks," delivered last year at the opening meeting of the Insurance Society of Edinburgh, may be specially mentioned.

As an Actuary his leanings were of a practical rather than of a purely scientific kind. His papers on the Statements required by the Life Assurance Companies Act, on the Measure of Expenses in Life Assurance Companies, and on the Progress of Life Assurance Business in the United Kingdom, are perhaps those by which he will be best remembered in Actuarial circles. But if he took no great share in the elaboration of scientific formulas and the development of technical and mathematical processes, he was of great practical assistance in furthering the interests of the Actuarial profession. An active member of the Actuarial Society of Edinburgh during almost the whole course of its existence, as well as of the Faculty of Actuaries by which it was ultimately absorbed, he held at one time and another nearly all the offices which either body had to bestow—Secretary, Member of Council, and President. He was also a Fellow, and

for some time a Member of Council, of the Institute of Actuaries. His opinions on all matters connected with the management of those bodies and the furtherance of the Actuarial profession were always listened to with interest and respect, and they were often of great assistance to his professional brethren. As a consulting actuary he had a considerable practice. Among other work performed in that capacity he investigated and reported upon several of the Funds which exist in Scotland for the benefit of the widows and orphans of members of professional and other bodies.

In our own Society, as well as in other Societies and Institutes throughout the kingdom for promoting knowledge and intercourse among Insurance men, he took a warm interest. He was one of the prime movers in establishing the Insurance Society of Edinburgh, of which he was elected the first President. Those who attended the meetings last June of the Federation of Insurance Institutes will remember with what spirit and geniality he discharged the office of President on that occasion.

Amid all his varied activities he found time for the enjoyment of literature—he was, for instance, a lover of Sir Walter Scott and an active member of the club in Edinburgh which keeps green his memory—and for occasional researches into bygone things and half-forgotten histories, a line of inquiry for which he had a natural gift, and of which he seems to have been fond. Some papers on such subjects contributed to “Caledonian Jottings” are evidently from his pen. But it was not only in business activities and mental recreations that he spent himself. He found time also for works of charity and benevolence. As President of the *Courant* Fund for Destitute Children, as a Director of the Royal Society for Home Relief to Incurables, and in various other ways, public and private, he helped to ameliorate the condition of the poor and afflicted.

Such was the man whom we now mourn. A man of good mental attainments, of high business capacity, and at the same time of wide sympathies, loyal to his friends, and always ready to lend a helping hand where he could. May we all, when our time comes, leave behind us such a record. Competent, diligent, and faithful in business—successful, too, in so far as it is in our power to achieve success—and withal mindful to look “not every man on his own things, but every man also on the things of others.”

G. M. L.

THE INSURANCE CLERKS' ORPHANAGE.

REPORT OF THE GENERAL COMMITTEE TO THE SECOND ANNUAL
GENERAL MEETING OF MEMBERS, TO BE HELD AT THE
REGISTERED OFFICE OF THE INSTITUTION, 11 QUEEN
STREET, CHEAPSIDE, E.C., ON 30TH MAY, 1904.

THE General Committee have much pleasure in submitting their Second Annual Report to the Members of the Orphanage, together with Accounts and Balance Sheet made up to the 31st March, 1904.

The amount received during the year was £2443 14s. 6d., and this sum is apportioned between Capital and Revenue in accordance with the Articles of Association, and as set forth in the Income and Expenditure Account appended hereto. The total Life Membership Subscriptions of £531 2s. represent 57 additional Life Members, whilst of the £682 19s. 6d. received as Annual Membership Subscriptions, £159 17s. 6d. was received from 474 new Annual Members, the balance representing renewal Subscriptions.

From this it will be seen that the number of Members was increased by 531 during the year, the total number on the register (allowing for lapsed subscriptions and deaths) standing at 2304.

It is gratifying to record the increased interest shown in the Orphanage in all parts of the United Kingdom, with the consequent augmentation of the funds of the Institution. Particular mention may be made of the entertainment at Manchester given by the Minnehaha Amateur Minstrels, and organised by the Manchester Insurance Institute and Association, by which the Orphanage benefited to the extent of £256 18s. 6d.; to the similar function organised by the Offices at Birmingham, realising £25, as well as several like efforts in London and the provinces. It is felt that

the character and success of these enterprises tend to show that the Orphanage is taking a hold upon the Insurance community, and is becoming recognised as a necessary appendage of the business.

A highly satisfactory feature of the year has been the receipt of contributions of £100 each from the Commercial Union, Union, County Fire, Provident Life, and London and Lancashire Fire Offices, and of £21 from the State. There are now twelve Companies who, without solicitation, have contributed to the funds as follows:—

Atlas Assurance Company	-	-	-	-	£100
Commercial Union Assurance Company	-	-	-	-	£100
County Fire Office	-	-	-	-	£100
London & Lancashire Fire Insurance Company	-	-	-	-	£100
Northern Assurance Company	-	-	-	-	£100
Phoenix Assurance Company	-	-	-	-	£100
Provident Life Office	-	-	-	-	£100
Sun Fire Office	-	-	-	-	£100
Union Assurance Society	-	-	-	-	£100
Westminster Fire Office	-	-	-	-	£100
Essex & Suffolk Equitable Fire Insurance Company	-	-	-	-	£26 5s.

AND

State Fire Insurance Company	-	-	-	-	£21
------------------------------	---	---	---	---	-----

The total expenditure for the year was £196 17s. 11d., of which £72 was for grants on account of Orphans. There are now three Orphans receiving the benefits of the Institution, two new cases having arisen during the year.

The balance of the expenditure, £124 17s. 11d., represents printing, stationery, postages, and working expenses generally.

During the year the General Committee have invested £2303 9s. 2d., making the total investments of the Orphanage £6803 9s. 2d. Consequent on the fall of securities there is a depreciation of £185 in the present market value of the Stocks held, but as the General Committee have no necessity to realise any of the investments, they have not been written down in the Accounts.

Although the Orphanage is at present in so satisfactory a position, and although the annual outlay on account of orphan children is the smallest item in the Accounts, the General Committee are confident that in time the usefulness of the Orphanage will be fully

proved, and, basing their views on the experience of a kindred institution, which at the end of its second year was in a similarly sound position, they are also of opinion that the need of the Institution is a far larger number of Annual Members, whose contributions shall not be confined to the minimum of 5s.

The General Committee desire to take this opportunity of tendering their thanks to the Members of the Local Committees in the different Insurance centres, to whose energy and enthusiasm so large a share of the present gratifying position of the Institution is due, as well as to those gentlemen who have kindly acted as Collectors in the various Offices with which they are connected.

The General Committee also desire again to make their acknowledgments to the Committee of the London Salvage Corps for the use of their premises as the Registered Office of the Institution.

A sense of obligation is also felt towards the Insurance Press for prominence given to matters connected with the Orphanage, as well as for gratuitous advertisements. The value of this form of assistance is much appreciated.

The following Members of the General Committee retire in accordance with the Articles of Association, and, being eligible, offer themselves for re-election, viz. : Samuel J. Pipkin, E. H. Holt, H. W. Andras, E. Baumer, W. E. Blake, and J. Headon Boocock.

The retiring Auditors, Messrs. Price, Waterhouse, & Co., being eligible, offer themselves for re-election.

SAML. J. PIPKIN, *Chairman.*

11th May, 1904.

THE INSURANCE CLERKS' ORPHANAGE.

ACCOUNTS TO 31st MARCH, 1904.

INCOME.		EXPENDITURE.	
To Balance brought forward from last		By Transfer to General Capital Account in accordance	
Account	£835 2 1	with the Articles of Association of the	
„ Subscriptions from Life Members ...	£531 2 0	Orphanage	
„ Donations of £20 and upwards ...	401 1 1	„ Working Expenses, Stationery, Printing, Postages	
„ Donations from Insurance Com-		and Petties, &c.	
panies	521 0 0	Grants.	
	1,453 3 1	„ Balance carried to Balance Sheet	
„ Annual Subscriptions from Members	£882 19 6		
„ Donations under £20	169 2 7		
„ Interest on Investments and on			
Money on Deposit	138 9 4		
	990 11 5		
	<u>£3,278 16 7</u>		<u>£3,278 16 7</u>

BALANCE SHEET, 31st MARCH, 1904.

To General Capital Account as at 31st
 March, 1903 £4,421 3 6
Add Amount received during the
 Year, being Life Subscriptions,
 and Donations of £20 and up-
 wards 1,453 3 1
 ----- £5,874 6 7
 „ Balance of Income and Expenditure
 Account 1,628 15 7

By Investments at cost :—

£5000 2½ per Cent. Consols	£4,622 10 2
£1016 16s. 0d. Birmingham Cor- poration 3 per Cent. Stock	1,001 2 3
£500 New South Wales 3½ per Cent. 1918 Stock	481 18 6
£500 London, Brighton & South Coast Railway 5 per Cent.	
Consolidated Preference Stock	697 18 3
	<hr/> £8,803 9 2
„ Cash at Bank, Current Account	£192 4 4
„ Cash at Bank, on Deposit	500 0 0
„ „ in hand	7 8 8
	<hr/> 699 13 0
	<hr/> £7,503 2 2

£7,503 2 2

AUDITORS' CERTIFICATE AND REPORT.

In accordance with the provisions of the Companies Act, 1900, we certify that all our requirements as Auditors have been complied with.

We have examined the above account of Receipts and Payments for the year ended 31st March, 1904, and the Balance Sheet as at that date with the books and vouchers of the Institution, and report to the Members that in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Institution's affairs, as shown by such books and accounts. We have verified the Investments appearing in the Balance Sheet which stand in the names of three members of the General Committee.

PRICE, WATERHOUSE, & CO., Auditors.

5th May, 1904.

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

Founded 12th March, 1897. Constitution agreed to, 12th June, 1903.

CONSTITUTION.

1. The organisation shall be called "THE FEDERATION OF Title.
INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND."

2. The objects of the Federation are to encourage the study of Objects.
all subjects bearing on every branch of Insurance, to promote the
technical education of junior Insurance officials, and to do all such
things as may be deemed desirable to advance the welfare and
efficiency of the Insurance profession.

3. The Federation shall consist of Institutes, Associations, or Member.
Societies in Great Britain and Ireland established for the above-ship.
named purposes.

4. The Institutes now forming the membership of the Federa-
tion are the following, viz. :—

The Insurance Institute, Manchester.
The Insurance and Actuarial Society of Glasgow.
The Insurance Association of Manchester.
The Insurance Institute of Ireland.
The Norwich Insurance Institute.
The Birmingham Insurance Institute.
The Insurance Institute of Yorkshire.
The Insurance Institute of Bristol.
The Insurance Institute of Newcastle-upon-Tyne.
The Nottingham Insurance Institute.
The Insurance Society of Edinburgh.

5. Insurance Institutes established abroad or in any of the
Colonies or Dominions of the British Empire may be affiliated

with the Federation on such terms and conditions as may be provided by the Constitution and Bye-laws, but shall have no control in the management.

6. The Institutes now affiliated with the Federation are :—

The Insurance Institute of Toronto.

The Insurance Institute of New Zealand.

The Insurance Institute of Montreal.

The Insurance Institute of South Africa.

7. The admission of new Institutes to the Federation, or of Institutes applying for affiliation, shall be by the unanimous vote of the Conference.

8. Subscribers of not less than One Guinea per annum to the Funds of the Federation shall be eligible as Honorary Members. They shall be entitled to two copies of the "Journal" for each guinea subscribed, and a list of all Honorary Members shall be published in the "Journal" each year.

Operations.

9. The operations of the Federation shall be regulated by an Annual Conference and an Executive Committee elected thereat, with such Special and Sub-committees (the Honorary Secretaries of which shall be appointed by the Conference) as may from time to time be determined upon, and may include

(a) The publication of a "Journal,"

(b) The holding of Examinations,

(c) The offering of Prizes for essays or research in any subject bearing on Insurance business,

(d) The formation of a Library of Insurance works,

(e) The encouragement and support of the Insurance Clerks' Orphanage and/or other charitable institution which may commend itself to the Conference, or

(f) Any other matter which in the opinion of the Conference may be considered desirable for the general welfare of the Federation or the Insurance profession.

Office-bearers.

10. The Office-bearers shall consist of a President, an Honorary Treasurer, and a Secretary, and of the Honorary Secretaries to all Special or Sub-committees, and shall be elected annually by the Conference, which shall also fix the remuneration of the Secretary. It shall be competent to the Conference to delegate to any Special or Sub-committee the election of one of its number as Honorary Secretary to such Special or Sub-committee.

Executive Committee.

11. The Executive Committee shall consist of two Delegates from each Institute, Association, or Society embraced in the Federation

in full membership, together with the Honorary Secretaries to all Special and Sub-committees and any others who may be appointed from time to time by the Annual Conference.

12. Any vacancy occurring in the Office-bearers or Executive Vacancies shall be filled up by the Executive Committee at a meeting specially summoned for that purpose, and the appointments so made may continue in force until the next Conference.

13. The Examiners shall be elected annually by the Conference. Examiners

14. The Annual Conference shall consist of the Office-bearers, Annual the President of each Institute, all Past Presidents, the Examiners Conference. for the time being of the Federation, the Honorary Secretaries of Special and Sub-committees, the Honorary Secretary of the Institute at which the Conference is held, and two Delegates from each Institute.

15. At all Meetings of the Conference and the Executive Committee the Chair will be taken by the President, or, in his absence, by one of the Past Presidents, whom failing the Chairman shall be elected from among those present.

16. All voting at the Annual Conference and at meetings of the Voting. Executive Committee shall be by Institutes, one vote only being allowed to each Institute, the President having a casting but not a deliberative vote.

17. The Conference shall not exercise any authority or control Authority over any Institute, Association, or Society embraced in the Federation except in matters directly relating to the interests of the of Conference. Federation, and if any question arise in connection with this Article it shall be decided by a vote of the Conference, two-thirds majority to decide the question, which must appear in the Agenda.

18. It shall be in the province of the Federation in Conference assembled to censure any Institute, Association, or Society, or terminate its membership, should it fail to effectively maintain the objects above set forth, or introduce any practice deemed to be inconsistent therewith, or otherwise infringe any part of this Constitution, or the membership of which may be deemed to be no longer advantageous to the Federation.

19. The duties of the Secretary shall be to keep the Minutes of the Executive Committee and of the Conference, to prepare the Duties of Secretary. Agenda for the same, to send out Notices of all meetings, to assist all Sub-committees when required in any of their duties, to conduct the correspondence of the Federation, and generally to do all such things as usually pertain to the duties of his office.

Honorary Treasurer. 20. The Honorary Treasurer shall receive and give receipts for all moneys due to the Federation, and shall pay all just debts and demands owing by the Federation, and shall render an account of the same each year to the Annual Conference, such account to be made up to the 31st December in each year, and to be printed and sent by the Secretary to the Delegates a clear week before the Annual Conference.

Funds. 21. The funds of the Federation shall be derived from

- (a) A levy laid on each of the Institutes, Associations, or Societies embraced in the Federation, the amount of such levy to be decided each year by vote of the Conference,
- (b) The profits accruing from the sale of the "Journal," the price of which shall be fixed each year for Members and Non-Members by the Conference,
- (c) Subscriptions received from affiliated Institutes, from Insurance Offices, and from Honorary Members.

22. The funds of the Federation may be used for any of the following purposes:—

- (a) Printing of the "Journal" and of all reports, circulars, certificates, or other documents authorised by the Conference or Executive.
- (b) Salaries of the Secretary or other officials authorised by the Conference.
- (c) Any other object which may from time to time be ordered by the Conference as conducive to the well-being of the Federation in promoting its operations, as defined in Rule 9.

Meetings. 23. The Conference shall meet each year in the month of May or June in such convenient centre as may be decided by the Conference from year to year.

24. The Executive Committee shall meet at such times as may be required by the necessities of business to be transacted, and the place of meeting shall be left to the decision of the President for the time being of the Federation.

25. Fourteen clear days' notice shall be given of all meetings of the Annual Conference and of the Executive, and the Notice calling the meeting shall state the principal business which is to be brought forward; but after the business stated in the Notice convening the meeting has been finished, it will be competent for any Delegate to introduce any other business for discussion only with the consent of a majority of votes.

26. The Executive Committee shall be called at any time by the Secretary on a requisition from three or more Institutes, and such requisition must state the object for which the meeting is requested. At such Special Meetings of the Executive, the only business which may be transacted will be that stated on the Notice as the special business for which the meeting has been called.

27. The meetings of all Special and Sub-committees shall be called by the Honorary Secretary of each at such times and places as may be most convenient.

28. It will be the duty of the Executive Committee to exercise ^{Duties of} during the year such control over the work of the Federation and of ^{Executive} all Sub-committees as may be desirable, to assist and direct when necessary such work, to deal with all matters on which an immediate decision may be required in the interest of the Federation, and to report to Conference.

29. Reports of all Special and Sub-committees to be submitted ^{Reports} to the Conference shall be printed and in the hands of Honorary ^{for Con-} Secretaries of each Institute embraced in the Federation and ^{ference.} Delegates one clear week before the date of meeting of the Conference.

30. The Publications Sub-committee shall submit to the Conference each year a printed report of its operations, with a list of proposed papers for the forthcoming volume of the "Journal," and any other suggestions connected therewith.

31. Subject to the provisions of the Constitution and Bye-laws, and for the purpose of promoting the objects of the Federation, the Conference shall cause Examinations to be held at such places as it may think fit, and shall prepare and publish Rules to regulate such Examinations, and to define the cases and circumstances under which the said Examinations shall severally apply, the subjects which they shall respectively comprise, the fees, if any, which shall be paid or deposited by candidates in respect of such Examinations, and the nature of the certificates, if any, to be granted to successful candidates. It may vary or rescind from time to time any of the said Rules of Examination, or add thereto, in any such manner as it may think fit, and may delegate to any Committees or Sub-committees such powers and instructions as may be necessary to carry out these objects.

32. The Honorary Secretaries to the Examiners shall submit to the Conference each year a printed report of the results of the

examinations, with recommendations for the examinations in the following year, and any other suggestions connected therewith.

Audit. 33. The Treasurer's statement of accounts shall be audited each year by two honorary auditors to be elected by the Conference annually.

Bye-laws. 34. The Conference shall make and alter such Bye-laws (not inconsistent with the Constitution) as may from time to time be found necessary, but two months' notice of any Bye-law to be proposed by any Institute, or of any alteration in an existing Bye-law, must be given to the Secretary, who shall forthwith intimate the same to the Honorary Secretary of each Institute embraced in the Federation.

35. All Bye-laws and alterations thereof must be sanctioned and approved by a vote of the Institutes represented at the Conference, a majority of two-thirds being necessary.

Alteration of Constitution. 36. No alteration or addition shall be made to the Constitution except at the Annual Conference, and two calendar months' notice must be given to the Secretary in writing of any such proposed alteration or addition, and it will be the duty of the Secretary to send copies of such proposed alteration or addition forthwith to the Honorary Secretary of each Institute embraced in the Federation.

37. No alteration or addition to the Constitution shall be made unless sanctioned by a majority of two-thirds on a vote of Conference.

BYE-LAWS.

1. Institutes affiliated with the Federation shall be charged an annual subscription to be determined by Conference, and shall be entitled to one copy of the "Journal" each year per member at the same price as is charged to the members of Institutes constituting the Federation plus the cost of carriage.

2. Should a vacancy occur in any Special or Sub-committee of the Federation, or Examiners, it will be competent for such Special or Sub-committee to fill up the vacancy till the date of the next Conference.

3. The President and Secretary of the Federation for the time being shall be *ex-officio* members of all Committees and Special or Sub-committees of the Federation.

4. Should the Delegate duly appointed to attend a meeting of the Executive Committee or Conference be unable to attend, the Council of the Institute may send, as a substitute, any member of the Institute.

5. At meetings of the Executive Committee, six shall form a quorum provided that they represent not less than four Institutes. The quorum for all Special or Sub-committees shall be decided by each.

6. Candidates for the Examinations in the Fire Department must be in the employ of an Insurance Company (otherwise than a Fire Insurance Company which is not a member of the Fire Offices Committee).

7. The names of all Offices subscribing to the Federation shall be published in the "Journal" annually, also the results of the Examinations and the Examination papers.

8. Each Institute is entitled to have one copy of the "Journal" for each of its members at the reduced price as fixed by the Conference annually, it being a condition of obtaining such copies at the reduced price that no member of any Institute shall be charged more than the reduced price, as fixed by the Conference, for his copy, and that no additional copies, whether applied for by members of Institutes or others, may be supplied at less than the published price.

9. The higher officers of Insurance Companies and representatives from any affiliated Institute or any other person of distinction may be invited to the Conference by the President for the time being with the consent of the Executive.

*** For all statements made, and opinions expressed,
** in the papers of this volume, the respective
writers are alone responsible.*



THE ELECTRICAL DRIVING OF COTTON MILLS.

By A. KELLY, A.M.I.E.E.

*A Paper read before the Insurance Institute of Manchester,
on December 8, 1903.*

THE most ordinary observer cannot but appreciate the great and interesting fact that of recent years electricity in some form or other has become a necessary adjunct to the manufacturing and engineering world and, judging by past experience, one would be very bold to try and prophesy as to its growth in the future. Its field at present is so extensive, covering as it does the driving of electrical trams, rail-roads, cranes, machine tools, printing machines, elevators, wood-working machines, and machinery of all kinds quite too numerous to mention, that it is not difficult to conceive that it will ultimately be connected with every department of the industrial world.

One great feature of the service that electricity has rendered is that it has enabled the enormous and latent power in rivers and waterfalls to be utilised by means of water turbines and generators and transmitting this power electrically over large areas, as may be instanced the Niagara Power Station, supplying light and power to Buffalo and other towns, also the numerous stations in Italy and Switzerland which time will not permit us to consider.

The power can be transmitted by means of either continuous or alternating currents, both of which have special advantages for particular purposes, and for the purpose of cotton mill driving the alternating current has generally been employed.

Fig. 1 shows the general appearance of an alternating-current generator arranged to be directly connected to and driven by a steam engine. The revolving field consists of a cast-iron spider bolted on to the engine shaft and carrying the steel magnet ring to which are fixed the poles. The poles are composed of sheet-iron

punchings firmly bolted together and wound with wire coils. The stationary "armature" is built up of laminations of sheet iron securely held in a circular frame of cast iron. The armature winding consists of insulated copper conductors held in slots of

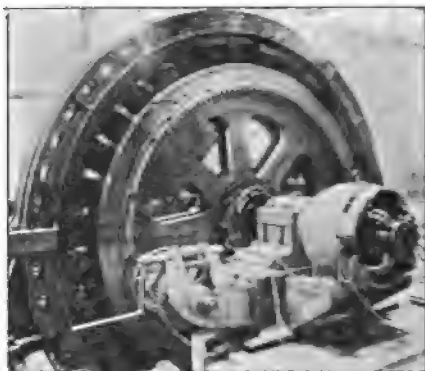


Fig. 1.

the laminations by wedges. Bolted to an extension of the shaft is a small continuous current dynamo known as the "exciter," and used for supplying continuous current to the revolving "field" by way of the contact rings around the shaft.

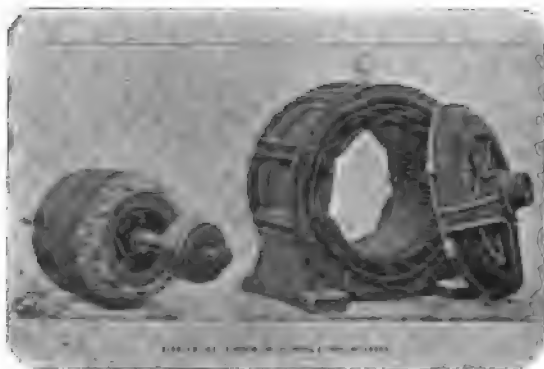


Fig. 2.

The motors are known as "induction" type motors, and consist essentially of two parts, one of which, the "stator," is fixed, while the other, the "rotor," is free to revolve. The

winding of the stator forms a primary, and is supplied with alternating current from the generator. The winding of the rotor forms a secondary, and the induced current in the winding produces a torque between the two parts, and so causes a rotation of the movable one.

In modern types (Fig. 2) the stator consists of a hollow cylinder built up of stampings of soft iron pierced with holes or slotted on the inside to receive the conductors. These stampings are supported in the cast-iron frame of the motor. The conductors are insulated coils of copper threaded through the slots in the stator core. The necessary terminals are fitted on the outside of the motor case and connected up in a suitable manner to the windings.

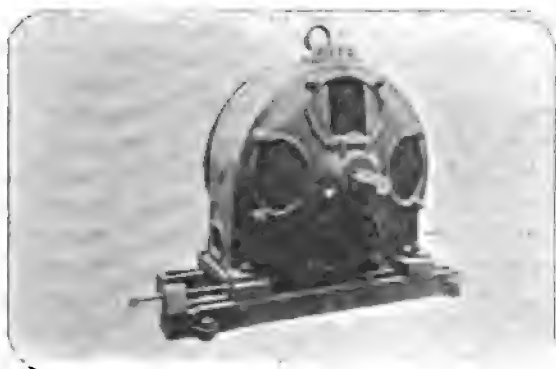


Fig. 3.

The rotor is simply a laminated cylinder of sheet-iron stampings with holes around its periphery, in which are wound the lightly insulated copper conductors. The ends of the conductors are brought to contacts or slip rings on the shaft for the purpose of inserting resistances in the circuit so as to obtain a gradual start. When the motor has attained its normal speed these resistances are cut out, and for all constant-speed machinery are in use only at starting.

These motors differ from the ordinary continuous current motor in the important respect that they have no commutator.

The stator conductors remaining stationary, and being embedded in and covered by iron, are in no danger of mechanical injury, and the greater freedom from risk of electrical or mechanical break-

down is a most important feature in favour of the induction motor. The motor is capable of standing a considerable overload, the only limit to the output being the heating of the stator conductors. Fig. 3 shows the motor ready for use.

The first use of electricity on any considerable scale was made for the transmission of power in bulk from distant waterfalls to the mill site.

The shortage of power at the Ponemah Mills at Taftville, Connecticut, U.S.A., suggested the possibility of utilising a water power situated four and a half miles away. Two electrical generators, each of 350 horse-power size, were installed at the waterfalls, and two corresponding large motors were fitted at the mill to drive direct on to the main shafting in the same manner as a steam-driven mill. It will thus be seen that the electricity was used purely as a means for the transmission of the power from the waterfall to the mill.

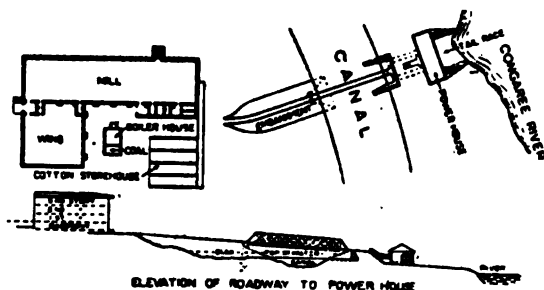


Fig. 4.

The next step in the development of the electric drive was at the Columbia Mills, South Carolina, U.S.A., the first textile mill to be equipped throughout and be dependent entirely upon the use of electricity as a motive power. This mill was erected some nine years ago, and it was intended to utilise a fall of water between a canal and a neighbouring river for the purpose of obtaining the power (Fig. 4). Owing to a want of space between the canal and the river, and the risk of floods, the mill building had to be placed some distance back from the canal upon a neighbouring hill. This distance was such as to render a mechanical rope drive too costly, so that the owners and engineers turned their attention to the alternative of electric driving. These circumstances obviously justified the trial of an electric drive because of the

facilities in transmission of the power from the water site to the mill site.

Instead of using one or two large motors for driving the main shafting in the manner previously described, a number of smaller motors were distributed throughout the working rooms driving on to the textile machines through light counter-shafting. In this manner the power was applied more directly to its work without the use of heavy main shafting with all its attendant losses. This is the system now used almost universally in all new mills where the electric drive is adopted, and is termed the subdivided system of driving.

In the power house, built between the canal and the river, are installed two horizontal water turbines, each directly coupled to a 500 kilowatt generator.

Throughout the mill are distributed some 20 motors, varying in size from 30 to 150 horse power, and the necessary connecting conductors between the mill and the power house are carried across a bridge over the canal.

As showing some of the difficulties that have to be overcome, due to the heavy floods in the rainy seasons, it is of interest to note in passing that at these times of flood the turbines in the power house are completely drowned out by the backing up of the tail water, the turbines and generators being as much as seven feet under water. Twenty-four hours' notice is telegraphed from up river when the floods are coming down, and this gives sufficient time to fix steel casemates around the generators to protect them against water damage.

Following the Columbia Mill came the Pelzer Mill of the Pelzer Manufacturing Co., South Carolina, where some 3000 horse power was transmitted a distance of two and a half miles, and plants were installed on similar lines at the Washington Mills, Laurence, and the Amoskeag Co.'s Mills, Manchester, New Hampshire—all using water power for the generation of the electric current.

Up to this time it will be seen that electricity was only used as an agent for the purpose of enabling the mill-owners to utilise the power of falling water, to be had at some distance away, to run their mills, the mill being placed in any convenient commercial position irrespective of the position of the water power.

With the number of plants now in operation, however, the advantages of the electric drive, as such, at the textile machines themselves began to be very apparent, and so clearly was this

being demonstrated by the ease of application and the flexibility of the whole system that the next step forward was the use of the steam engines to drive the generators, using the sub-divided system of motor-driving in the mills as before.

This was the greatest advance that had been made in the use of the electric system, and was first adapted at the Lancaster Mills, Clinton, Mass. This mill was previously partly driven by water turbines and partly by steam engines with the ordinary mechanical rope drive. In 1898 the Metropolitan Water Board of Boston acquired the water-shed in order to use it as a reservoir for supplying the City of Boston with water, so that the Lancaster Mills were compelled to make arrangements for driving that portion of the mills, about one-half, previously driven by the water turbines.

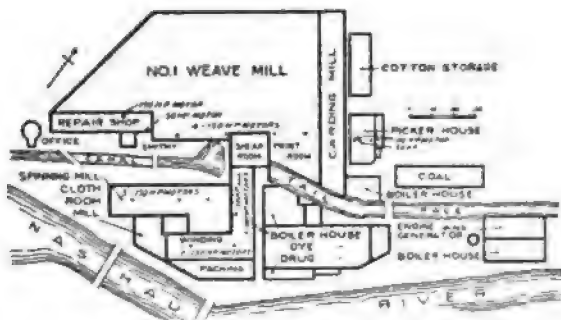


Fig. 5.

So successful had been the results of the electric drive in point of reliability, the mill officials decided to instal the steam-electric drive. A separate power house was built, quite apart from the mill buildings (Fig. 5), in a suitable position for the proper and convenient supply of coal and water, and one 2000 horse-power horizontal steam engine, directly connected to a 1250 kilowatt generator, was installed. The power house is placed 800 feet from the centre of the mill buildings, and the conductors are carried in underground conduits to the mill.

A number of motors, to the full capacity of the plant, were installed in the working rooms, and within 12 months from the starting up of this plant, when it was found desirable to replace the old existing steam engines, the power house was enlarged and a second horizontal steam engine of 2500 horse power, coupled to a

1650 kilowatt generator, was installed, so that now the entire mill is operated electrically.

In this way all the power plant, both engines and boilers, is centralised in the one building, and by the sub-division of the motor-driving a number of the previous main rope drives and heavy gearing were entirely dispensed with.

This mill has a capacity of some 90,000 ring spindles, 3680 cloth weaving looms, together with all dyeing, bleaching, and finishing machinery.

Following the experience gained at the Lancaster mills, a number of electrical plants were installed in existing mills for the purpose of replacing or assisting mechanical rope drives, and the results obtained so far justified the change that the next step



Fig. 6,

forward was the erection of a new mill specially built and designed for the use of the electric drive with steam-driven generators. This was the Olympia Mill, Columbia, South Carolina (Fig. 6), a building some 553 feet long by 151 feet wide and four stories in height. The work of construction commenced in 1899, and the mill started in 1901.

In addition to supplying power to run the mill, it was intended that power should also be supplied to the Capitol City Mills, one and a half miles away (250 horse power), and to the Electric Light and Street Railway Co., so that the plant is somewhat larger than required for the mill alone. The power plant is contained in a separate building adjacent to the mill, connected thereto by a passage, but so arranged as not to interfere with the proper

lighting and ventilation of the mill (Fig. 7). The engine-room contains three vertical cross-compound 1600 horse power steam engines, each directly connected to a 1300 kilowatt generator, the auxiliary machinery and the main switch-board fitted with all the apparatus for controlling the current. The mill manufactures cotton goods, prints, and cloths, and has a capacity of 104,000 ring spindles and 2500 looms.

Following the Olympia Mills, the Buffalo Cotton Mills, Union, South Carolina, with 35,000 ring spindles, the Seneca Mills, Seneca, South Carolina, the De Kalb Mills, Camden, S.C., and the Inman Mills at Inman, S.C., each with about 20,000 spindles, were rapidly built and equipped with the electric drive, using steam-driven generators contained in a power house placed in convenient position for fuel supplies.

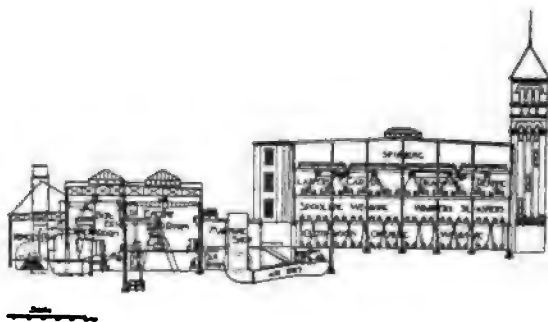


Fig. 7.

All these new electrically-driven mills so far had been built in the Southern States; but the New England manufacturers were realising the advantages of the system, and the latest electrically-driven mills are the Soule Mill and the Butler Mill, New Bedford, Massachusetts.

These mills are practically identical with the ordinary Lancashire mills, having ring spindles for spinning the coarse counts and mule spindles for the fine counts of yarn.

The Soule Mill has a capacity of 24,000 ring and 24,000 mule spindles, together with 1000 looms, and additional textile machinery up to a total capacity of 60,000 spindles and 1400 looms are now being fitted.

The Butler Mill has been built for a capacity of 100,000 spindles, ring and mule, with 2000 looms.

Within the last three years 12 new mills have been built and designed for the electric drive, using steam-driven generators, and up to June this year some 70 mills were equipped with about 55,000 horse power.

Having thus traced the development and growth of the electrical driven mills in the United States, it will now be of interest to describe some of the electrical apparatus in more detail, and the motor applications in the working rooms of the mills.

Commencing with the power house, these do not differ in any material respects from power houses supplying alternating current for other purposes in this country, and mainly consist of a boiler room and an engine room.



Fig. 8.

The boiler room generally contains a number of water-tube steam boilers for the generation of the necessary steam required to drive the steam engines.

The engine room contains the steam engines directly connected to the electric generators. Both the horizontal and the vertical types of cross-compound slow-running steam engines are in general use, the high-speed enclosed engine not apparently having met with much favour in the States.

The generators are of the three-phase revolving field type, and are coupled directly on to the engine shaft, being often placed between the high and low pressure cylinders.

Fig. 8 shows the engine room with three generators in use at

the Olympia Mill. In addition to the main generators, a small steam exciter is usually fitted for the purpose of supplying current to the magnets of the generators and also used after working hours for the pilot lighting of the mill.

As showing the developments that are taking place in the prime movers, we should mention the steam turbine used for driving electric generators. The idea of the steam turbine is quite simple, and is similar to that of the water turbine or impulse wheel. A comparison of the space required between an ordinary reciprocating steam engine and a turbine of equal power is very marked, and a turbine can be run quite as economically as the ordinary type of engine.



Fig. 9.

Along the wall of the engine room is fitted the main switch-board (Fig. 9), arranged in separate panels for the generator, motor, and lighting circuits. The generator panel is provided with main switches and fuses controlling the whole of the current, field circuit switch, and recording ammeters showing the total output of the generator. The motor panels are provided with switches and fuses, and recording ammeters to show the amount of power taken by each motor. In the event of any excessive overloading or derangement of the motor or shafting it is instantly shown by the meters, and can be remedied before any damage occurs.

Periodical readings are taken of these meters, so that the manufacturers can ascertain exactly the amount of power required to manufacture any particular class of goods, and they also serve to enable him to detect at once any unnecessary consumption of power

due to poor alignment or improper oiling of the shafting. In this way the plant is maintained at its highest state of efficiency.

After leaving the switchboard the conductors pass to the mill either by a wire tunnel between the power house and the mill or by underground conduits. Vertical ducts are left in the brickwork of the walls of the mill to enable the conductors to reach the different floors. Inside these ducts the conductors are supported upon porcelain insulators, and protected by boards screwed to the front of the ducts. For the horizontal runs two of the floor planks are left out to form a channel to accommodate the wires (Fig. 10), and in this way the wires are well out of the way and protected, no holes being required in the brickwork or wood joists.

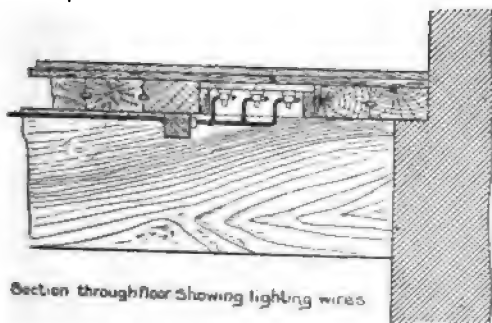


Fig. 10.

All the motors in use are of the alternating-current induction type. The simplicity in the construction and the absence of a commutator reduces the amount of attention required to a minimum. The stopping and starting is performed by the mill operatives, the switches being fitted in any convenient position, generally on the building columns.

The motors not being enclosed, but ventilating freely into the working rooms of the mill, are periodically blown through with compressed air to remove cotton fluff.

Wherever possible, the usual practice is to suspend the motors from the underside of the ceilings, the timber joists being replaced by steel channels of the same depth, which not only carry the floor but are sufficiently stiff to carry the extra weight of the motors. This arrangement results in a saving of floor space, and enables horizontal belts to be used where they are required.

Fig. 11 represents the scutching-room drive at the Lancaster Mills, in which one motor is used for driving two line shafts by means of belts.



Fig. 11

In the carding-room, on account of the low speed of the machinery, it is necessary to use a counter-shaft.



Fig. 12.

Fig. 12 represents the card-room at the Pelzer Mill. In this

case, as before, the motors are fixed out of the way on the under-side of the ceiling, and drive on to the line shafts by belting. Each motor is fitted with two pulleys on one end, and from these pulleys belts lead in opposite directions to the main line shafting.

Coming next to the spinning-room, the ring frames at the Pelzer Mill are driven by motors of 140 horse-power capacity. These motors are suspended from the ceiling joists, and, as in the carding-room, each motor is equipped with two pulleys on one end. This was the method employed at first in driving spinning frames, and is preferred by some engineers to-day.

At the Lancaster Mill each motor is equipped with four pulleys, two at each end, and is belted to the counter-shafts over the ring frames.

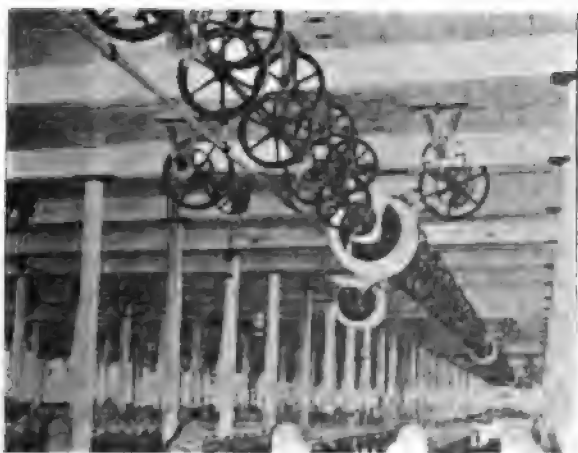


Fig. 13.

At the Anderson Mill, Anderson, South Carolina, an entirely different plan of driving ring spinning frames has been adopted. In this case a small motor is placed on the floor between two spinning frames and directly connected to their driving shafts through friction clutches. Between these frames and the generator, ten miles away, there is not a single belt or transmission shaft, and there is no doubt that this method of driving will give the greatest production. Some 107 of these motors have been installed in this mill, but the high first cost, the lower efficiency of the smaller motors, and the difficulty of changing

speeds to suit the different counts of yarn, have prevented the more general adoption of this system. It is, however, a perfect drive, and should be of advantage to those mills always spinning a constant count of yarn, for the absence of all shafting and the ability to run only those machines that are required make the system a desirable one in special cases. This mill spins a constant number of yarn, and consequently the front rolls can be operated at the same speed all the year round.

Fig. 13 shows the latest method employed to drive the ring spinning room in use at the Olympia Mill, South Carolina. The shafting and motors in this case are fixed on the ceiling of the card-room below and the belts pass through the floor, one belt

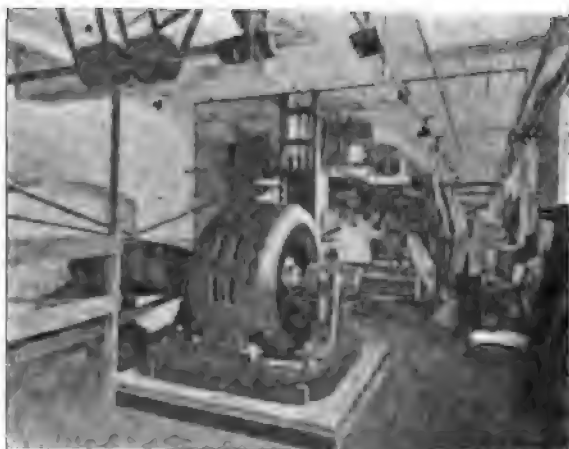


Fig. 14.

driving two frames by means of quarter-turns and idlers. Each shaft is divided into five sections with the motor directly connected to the centre. Some engineers object to placing the shafting in the room below on account of the short belts and the holes on the floor. It has the advantage, however, of having the shafting concentrated as much as possible on one floor, and there is no belting or shafting in the spinning-room to carry lint. There is about 50 feet of shafting on either side of the motor, and a flexible coupling allows for any variation in alignment of the shafting. For the driving of mule spinning frames the motors are suspended from the ceiling and directly coupled on to a

section of the shafting as before, each motor driving 4 to 6 pair of mules.

Coming next to the weaving shed, Fig. 14 shows the method adopted at the shed of the Lancaster Mills and at all the later and newer sheds. In these cases all the motors and shafting are placed in a basement below the floor level of the weaving shed, and the looms are driven by light belts passing through on to the shafting below. In this way all overhead shafting and belting are dispensed with, resulting in a splendid top light for weaving, and no risk of oil dropping on to the cotton goods from revolving shafting.

The motors vary in power according to the type and number of machines to be driven, ranging from 30 horse-power size for driving the scutching-room, mechanics' shops, &c., to 150 horse-power size for driving the spinning and weaving machinery. Each motor has its own starting switch fitted in any convenient position, generally enclosed, together with the cut-outs, in an asbestos-lined timber box fitted on the building columns. The "open wiring" system, using india-rubber covered conductors supported upon porcelain cleats or saddles, is in general use.

The timber construction of the mill floors allow of the saddles being fixed in any position, and the whole idea is to so rigidly secure the conductors that they cannot come into contact with each other or any other conductor if loosened by shrinkage of timbers and floors, or by careless knocking.

The electric lighting of the mill is provided, during working hours, by the same generator supplying the power, the conductors being run in the same manner as the power conductors. The lighting system is kept quite distinct from the power system, the current being transformed down by static transformers to a suitable pressure for use with the incandescent lamps.

Having thus briefly described the application in general use in America, let us now consider the reasons that warranted the adoption of the electrical driving in preference to the mechanical system.

In the case of the larger mills, where the
Large Mills. machinery is situated in several mill buildings, each containing its own engine and boilers, together with the attendant staff of engineers and stokers, the electric drive has considerable advantages, for by its use all the power plant can be concentrated in the one building.

In such cases the generating plant running is arranged so as to

operate at approximately full load at all times ; thus there is a distinct economy over a number of scattered engines and boilers working at times at only a portion of their normal capacity. By this concentration the power is developed under the conditions of the highest economy both as regards the working costs and the number of the staff required.

Taking the case of a small mill built with a view
Small Mills. to future extensions, if the mechanical system is installed the rope race must be made wide enough for the original building as well as the extensions.

The driving wheel on the engine must be sufficiently large to carry the subsequent additions as well as the present mill. As to the engine, if this is of sufficient size to drive the larger mill then it has to work at an uneconomical point whilst driving the smaller mill.

As an alternative, sometimes one side of a cross-compound engine is installed at first, the other cylinder being added when the enlargement is made. This again is objectionable, as the small engine will be uneconomical and have the irregular turning of a single crank engine.

Whichever of these plans is adopted, the amount of the extension must be determined in advance ; it may be years before the extension is made, yet the cost and uneconomical operation must be borne by the first mill.

Compare all this with the electrically-driven mill, where the power is put down for immediate requirements only without any regard for the future requirements—always an unknown quantity.

When the time arrives for the extension to be carried out (Fig. 15), an additional generator, along with its complement of motors, can be installed, and the extent of the addition need not be considered until the time when it is necessary, and in this way the power plant is always working at its maximum efficiency.

Owing to the flexibility of the electric drive,
Flexibility. extensions and additions can be made to the buildings without any regard to their location in respect to a drive, as the power is readily transmitted to any section of the works.

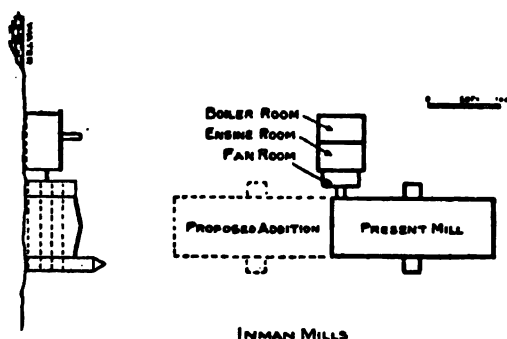
The convenience of being able to run any section of the mill for overtime or other purposes without the need of having to drive the whole of the mill shafting is of great importance.

If the mill is producing an unusually low count of yarn then the preparation machinery can be run overtime so as to keep the spindles fully employed during the working hours.

Taking the case of the weaving, a portion of the looms can be run after working hours on any specially urgent orders.

Where the Northrop loom with automatic shuttle is in use, it is usual to keep the whole shed running during the meal hours without the operatives, so that the cloth production is materially increased.

The variation in speed in one section due to slipping on such belting as is still retained is not communicated to other sections, and the mill not being dependent upon one main drive, there is less liability of a stoppage due to an accident within the rope race.



INMAN MILLS

Fig. 15.

Owing to the reduction of the number of steps in transmission by the removal of belts, a more uniform speed is attained by the electric than the mechanical drive, and the system that maintains the speed of the machinery at the highest maximum permissible must show the largest production.

It is always difficult to state definitely the amount of the increased production, so much depending upon other factors, but the mill-owners having experience of both the electric and mechanical drive place it at about 4 per cent. on the weaving and 6 to 8 per cent. on the spinning.

By reason of the sub-divided drive the amount and size of the shafting is considerably reduced, and the same holds good in respect to the ropes and belts.

The Olympia Mill requires some 3600 horse power, and the largest sized shaft in the mill is 3 inches diameter for the receiving pulleys, with the majority of the lengths only 2½ inches. Compare this with any mechanically-driven mill of equal power, and the advantage of the lighter shafting will be readily appreciated.

In the case of a new mill, by reason of the sub-
Saving of Space division of the motor driving, the usual rope race
and Better is not required, and this space can be utilised for
Lighting. textile machinery.

In a mechanically-driven mill it is necessary to place the engine-room so as to obtain a direct drive on to the line shafts. This interferes with the proper lighting of that portion of the textile machinery about the engine-room.

No such limitation obtains in the case of the electrically-driven mill, for the power house is located preferably away from the mill so that textile machinery may obtain the full benefit of the daylight, an important feature in the manufacture of the finer quality of goods.

It sometimes occurs where a new mill is contemplated that the amount of the ground available is restricted and not sufficient to accommodate a mill building large enough to take the modern length of mule together with the engine-room. In such a case, if electric driving is adopted, the engine-room can be placed quite away from the mill site and the ground laid out to the best advantage for the mill building.

The power required to operate any section of the mill is readily measured and continuously indicated by the instruments on the switchboard. By these readings the preparation can be balanced up against the spinning, so that the spindles can be kept at their maximum capacity.

Very special enquiries have been made at each
Freedom from of the mills as to the cost of maintenance and
Breakdown and repairs of the motors and generating plant, and
Cost of Up-keep. the replies were unanimous in that the cost of repairs was practically nil.

The Columbia Mill has been running nine years, and the cost of repairs to the electrical plant has not averaged £5 per annum on an installation of 1380 horse power.

This compares most favourably with any mechanically-driven mill using the most modern system of rope driving.

Where upright shafts and bevel wheel gearing is in use, many cases of breakdown have occurred causing a stoppage for several weeks. This results not only in the expense of the repairs, which are relatively heavy owing to the work having to be carried out night and day so as to get the mill running at the earliest possible moment, but also in a loss of profits and fixed charges during the stoppage, and, what is also important, the scattering of the employees.

The margin of profit is now so fine that it is of vital importance to be as free as possible from any risk of breakdown, as a stoppage of even a few hours may result in a loss on working.

On large plants the loss between the engine and the shafting driven by the motors will vary between 16 per cent. to 18 per cent. In other words, 82 per cent. to 84 per cent. of the power delivered by the engine will be delivered by the motors. This compares favourably with a mechanical rope drive where a loss of 25 per cent. is considered a fair average, and is a distinct improvement over mills with long outlying drives. Many instances occur in mechanically-driven mills where a saving in power alone could be readily effected by grouping the outlying drives and driving them electrically by motors obtaining current from a generator driven by the main engine.

The electrical drive does not increase the mill cost by the amount of money paid for the electrical equipment. In many items the first cost is greatly reduced, for with the electric drive, no rope race being required, the cost of the mill building is reduced on account of the absence of transverse walls through the mill.

The main drive being omitted, the size of the shafting required is much smaller, and the use of the light shafting makes for economy in other directions by the use of lighter hangers, brackets, and smaller pulleys.

The lighting installation being taken from the main generator, the cost of separate lighting dynamos is not incurred.

It often occurs, in the case of a low-lying mechanically-driven mill, that the position of the engines being fixed in relation to the mill building the engines have to be raised on massive concrete foundations to a sufficient height to allow of the return flow of condensed steam and circulating water to the cooling lodge. With the electric drive the engines can be placed close to the lodge, and no such costly foundations are required.

It is interesting to note that in the case of the Olympia Mill (3600 horse power), before the electric drive was finally decided upon, two sets of plans were drawn out for the mill—one for the electric and the other for the mechanical drive, with the usual belts and shafting throughout. The tenders obtained on these plans resulted in the electric drive coming out the cheaper.

By the use of electricity the cost of the mill building was reduced by 10 per cent. on account of the absence of the rope race and the heavy shafting.

Sixty-one per cent. of the cost of shafting and sixty-six per cent. of the cost of the belts and ropes was saved with the electrical system. The saving due to these three items was sufficient, it is said, to pay for the cost of the electrical equipment.

On the other hand, taking the case of smaller mills, the first cost is more for the electric than the mechanical drive. It amounted to about £1600 for the Seneca Mills; but the manufacturers considered that the advantages derived very much more than off-set this difference in cost, the mill being built with a view to future extensions, the interest on the additional capital outlay being a small item compared with the advantages, as already mentioned.

The rapid increase in the number of mills electrically driven in the United States alone during the past few years under identical conditions that obtain here in Lancashire is a marked sign that the advantages of the electrical driving have been amply demonstrated.

This noiseless and efficient power that has proved so successful in its application for many other purposes, will certainly compare most favourably with any mechanical system for cotton mill driving, so that we may look for a considerable development in this country.

The author is indebted to the leading electrical engineering firms for the use of lantern slides and illustrations of machinery of their manufacture.

SHOP RISKS.

By J. S. WATERSTONE.

*A Paper read before the Insurance Institute of
Newcastle-on-Tyne, February 26, 1904.*

ON first approaching this subject one is struck with its seeming simplicity, but on a closer examination it will be found that this is more apparent than real. Commonplace it may be, but the predominance of the commonplace is an accepted fact, and while, of course, it is much more interesting to study something entirely novel, it is occasionally beneficial to turn to the things of our every-day business life and examine them a little more closely than we are wont to do.

You will remember the occasion on which we were called a nation of shopkeepers, and while we can regard such a gibe with indifference, considering the circumstances under which it was uttered, it may nevertheless serve to remind us that a large proportion of the nation's wealth must lie in its shops, and that consequently no inconsiderable portion of the premium income of our Fire Insurance Companies must be derived from the insurance of such risks.

Assuming, then, that we have come to the conclusion that there are possibilities of latent interest connected with our subject, the question remains, how should it be treated in a paper of this description? It is obvious that any attempt to enter into full details connected with each trade in the time at command would not only be impossible, but altogether superfluous, as, in the first place, the ground in many parts has already been well covered, and, secondly, it would be absurd on my part to make such an attempt, as many of you must at least know as much as I do on the subject. After lengthy consideration, therefore, I have come to the conclusion that it will be well to treat the matter in as comprehensive a manner as possible,

dealing with it in a collective sense rather than in an individual one.

Prior to the issue of the new Shops Tariff in 1897 the business was notoriously unprofitable, and it would now appear that the new rates in some instances are still inadequate. The experience of the Offices in this district has been a singularly disastrous one during the last five or six years, upwards of £100,000 having been lost through one fire alone—namely, that which broke out in Sunderland in the large drapery premises known as “Havelock House,” in July, 1898. This deplorable conflagration was largely due to the inefficient state of the town Fire Brigade, who were quite unable to confine the fire to the premises in which it broke out, with the result that the flames spread in all directions, laying waste portions of several of the adjoining streets. This leads me to say how admirable, in my opinion, is the system laid down in the universal Mercantile Schedule, which is in operation in various parts of America, of penalising those towns where the authorities are indifferent to the necessity of providing adequate fire appliances. This is done by means of a key rate, the rate varying according to the circumstances of each town so far as fire risk is concerned, the fact of a town being thoroughly well equipped or not in the direction referred to being an extremely important factor.

As has frequently been pointed out, the municipal authorities are directly responsible to the ratepayers in this respect, and if by raising their premiums their remissness were brought home to them matters would probably be speedily remedied. It would appear to be premature, however, to discuss the introduction into this country of any such fundamental change in the method of rating. The time is not yet ripe. Minor changes, to which I will refer later on, might, however, be adopted in regard to the rating of certain shop risks, especially Drapers' risks, which doubtless would have a salutary effect, and be the means of placing the business on a more profitable basis.

It is an open secret that many Companies have within recent years considerably reduced their retentions on Drapery and other establishments dealing in light textile fabrics, nor can this be wondered at when one recollects the amount of damage which can be done by even a small fire owing to the enormous quantities of water often used. The primary idea is, of course, to extinguish the fire at the earliest possible moment,

this being all important, especially when one considers how involved some of these establishments are, but there would sometimes appear to be a certain lack of judgment shown. One thing appears to be pretty clear, and that is that the amount of damage done to the stock is very often out of all proportion to that done to the building, and this being the case, it would seem that some differentiation should be made in the rating between the building and the stock. It will be remembered in this connection that the Shops Tariff (Scotland) only applies to contents.

Some extremely heavy losses were sustained last year in shop properties, and perhaps I cannot do better than read to you an extract from the leader on Fire Business for 1903, which appeared in the *Post Magazine* of the 2nd January last, and which enumerates the most important of these :—

“ Among the classes of risk which have suffered most in the past year Drapers are still unenviably prominent ; indeed they bid fair to become a perennial source of loss, and there is very little doubt that a material rise in the rates throughout the United Kingdom will follow if some abatement does not speedily show itself in the number of serious fires. Losses were indeed so frequent and heavy in Ireland last year that in March the rates were advanced. The most disastrous outbreaks occurred in Londonderry, where two large establishments went down—Walkers', involving a loss of £17,000, and Austin & Company's, a loss of £16,000. In Scotland, also, Drapers have been burning far too frequently, the bad experience culminating in a total loss of some £84,750 in the recent conflagration in Buchanan Street, Glasgow, where two large risks—a milliner's and a fancy goods dealer's suffered destruction. To these we must add Hayman & Son, Totnes, loss £13,800 ; Lucking & Company, Colchester, £10,000 ; Laurie & McConnel, Cambridge, £25,000 ; and the Civil Service Supply Association, in the Haymarket, London, where the damage amounted to about £20,000. In conjunction with numerous small losses this experience must have cost the Offices a considerable sum, and cannot be allowed to continue without decided protest.”

**Hazardous
Blocks.**

I have already referred to the congested nature of large shop areas, and I now propose to deal with this question at some length.

There are in practically all our large towns huge blocks of

shop property, which are not only examples of concentrated risk in themselves but are a positive menace to the neighbourhood in which they stand, and to make matters worse, the streets which separate them one from the other are often extremely narrow. Frequently of five or six storeys in height, they are occupied by all classes and conditions of tradesmen, and although the shops, to look at them from the front, appear to be divided from each other by walls up to the roof, with perhaps here and there a complete party wall rising above the roof, yet an examination of the premises at the rear frequently discloses the fact that communications of various kinds exist, the principal of these being roofs of light and inflammable construction, with unprotected windows either at right angles or facing one another. This may largely be accounted for by the fact that as these establishments grow all available vacant space at the rear is utilised for the purpose of extension, the buildings often being of one storey, with timber and glass roofs, which would quickly be the means of a fire spreading, should one break out. As the *Post Magazine* has it in the leader already referred to:—

“The growth in bulk of buildings recently erected and the ever-increasing destruction in the business portions of our large towns are plainly adding to the conflagration hazard. The tendency is to involve more and more in a single risk, and the Offices are viewing this development with no little apprehension.”

Another unfavourable feature which deserves mention is the growing practice of replacing windows of reasonable size by others whose dimensions can only be characterised as enormous. It is not uncommon, for instance, to find a line of Drapers' shops where the windows present the appearance almost of one continuous sheet of plate glass, and I am of the opinion that in the event of those panes of glass being broken during the progress of a fire the flames would quickly leap from one shop to the other, assisted as they would be by the quantity of ornamental woodwork common in these large and magnificent shop fronts. Many very large buildings are now supported almost entirely by iron columns and girders, and, as you are aware, the expansion of such iron work during the progress of a large fire is generally so great that it frequently is the means of causing the building to practically collapse.

An examination of the interior of these large shops reveal floor openings of all kinds, including wooden staircases, well holes and hoists, in addition to ventilator shafts and small openings for steam and hot water pipes, etc. The walls also are frequently lined with match boarding. Imagine such buildings in an American city, where the Universal Schedule (to which I have already referred) is in operation, and one is almost afraid to think of what the rate might work out at. In order that a comparison may be made, the following is a description of a Standard Building as given in the Schedule:—

“A Standard Building is one having walls of brick or stone (brick preferred), not less than 12 inches thick at top storey (16 inches if stone) extending through, and 36 inches above roof in parapet, and coped and increasing four inches in thickness for each storey below to the ground, the increased thickness of each storey to be utilised for beam ledges. The ground floor area not over 2,500 square feet, (say 25 by 100); height not over four storeys, or 50 feet; floors of a two-inch plank (three inches better), covered by seven-eighths or one-inch flooring crossing diagonally, with waterproof paper or approved fire-resisting material between; wooden beams, girders and wooden storey posts or pillars 12 inches thick, or protected iron columns; elevators, stairways, etc., cut off by brick walls or by plaster on metallic studs and lathing, communications at each floor protected with approved tin-covered doors and fireproof sills; windows and doors on exposed sides protected by approved tin-covered doors and shutters; walls or flues not less than eight inches in thickness, to be lined with fire-brick, well-burnt clay, or cast iron, and throat capacity not less than 96 square inches, if steam boilers are used; all floor timbers to be trimmed at least four inches from outside of flue; heated by steam; lighted by gas; cornices of incombustible material, roof of metal or tile, if partitions are hollow or walls are furred off there must be fire stops at each floor.”

While it is admitted that the above requirements are of an extremely stringent character, most builders and architects regarding the rule requiring an increase of four inches in thickness for each storey to the bottom as being too severe a requirement, the Schedule goes on to state that “Such a building would be calculated to confine a fire within its own four walls, and we do not hesitate to express the opinion, after long con-

sideration of the matter, that all buildings in the compact portions of cities should be constructed in this manner. In isolated locations, where the owner of land has no neighbours, he may well claim that he should be allowed to build as he pleases, but proper consideration for community interests requires that in cities and towns each property owner should be required so to build that the burning of his property would not necessarily destroy that of his neighbour. Whatever hardship this may be to him is more than off-set by the great advantage of having his neighbours held by the same rule in view of the fact that they out-number him a thousand to one."

I propose to examine in detail some important blocks of the kind above referred to, situated in several of our large towns, which are typical of many others throughout the United Kingdom, and I would refer you to the accompanying plans for guidance and full particulars. Plan No. 1 shows a block which has some exceptional features. It must be one of the largest in the provinces, and contains four important Drapery Establishments, the number of hands employed by these firms varying from about 200 in one case to close on 800 in another. Unfortunately, complete party walls between the various risks are principally conspicuous by their absence, so that a fire originating in any one of these shops would imperil the whole of the block.

In addition to the Drapery risks there are also a number of other hazardous trades in the area in question, comprising two firms of Printers by power.

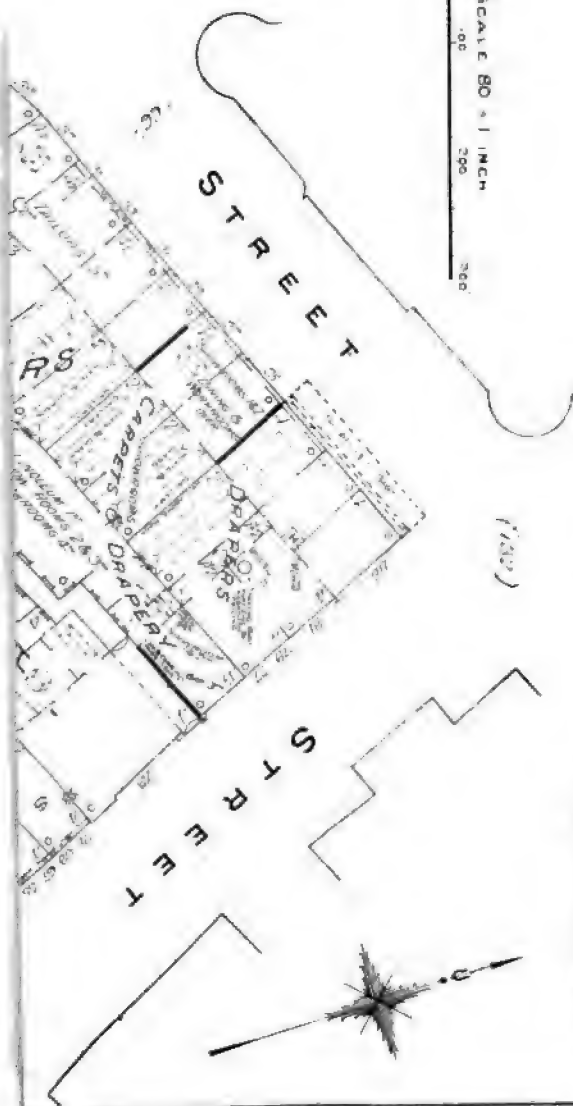
It will be observed that there are really two blocks in Plan No. 2, but they are separated by such a narrow street, that from a fire risk point of view we may take them as one. The more important of the two is occupied chiefly by large firms of Drapers, the party walls between them being, unfortunately, incomplete. The smaller block is dominated by another large Drapery firm, and extensive Clothing Stores occupy no inconsiderable portion of it.

Part of the property shown in Plan No. 3, occupied as Drapery premises, was recently destroyed by fire. The loss amounted to over £50,000, the outbreak having been caused by an assistant having accidentally ignited a small flag which formed part of some special window dressing whilst lighting the gas. The principal tenants are three important firms of Drapers and Outfitters and a firm of Furniture Dealers.

— FROM —
INSURANCE PLAN —

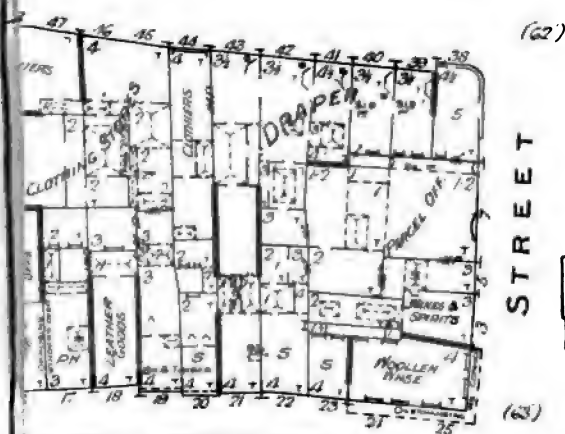
N^o 1.

SCALE 80 ft 1 INCH
 0 100 200 300



CHAS E GOAD.
City Engineer
 53 New Broad St
 LONDON
 E.C. 4
 TORONTO & MONTREAL BRANCH

— FROM —
INSURANCE PLAN



DM -
CE PL

E T

7 6
5 0 3

HW

211

1 0

0 0

0 0

0 0

0 0

0 0

0 0

0 0

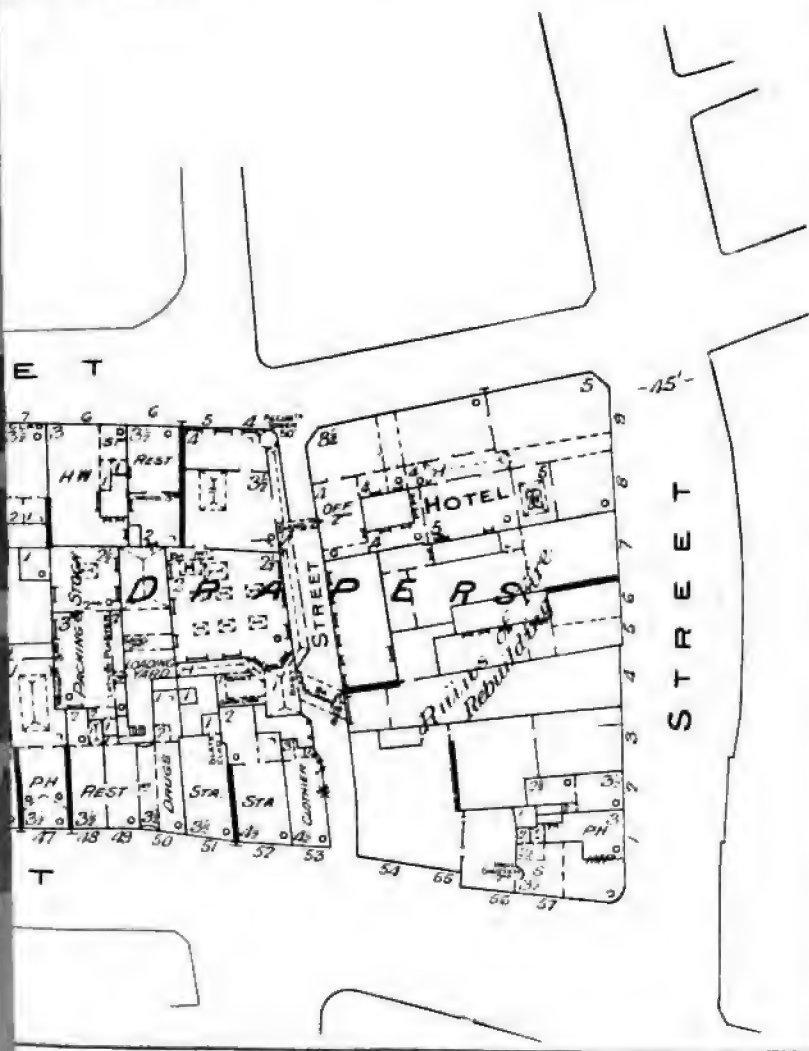
PH 0

3 0

17

T

CE PLAN



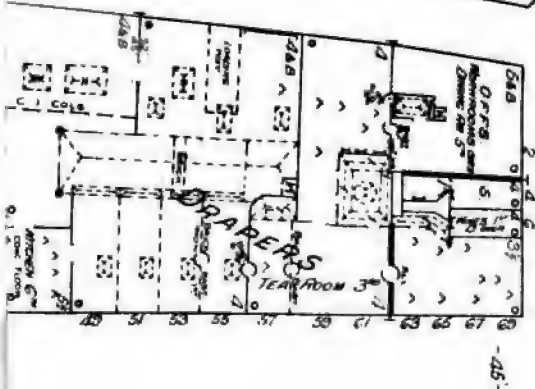


— FROM —
INSURANCE PLAN

N: 4

STREET (157)

— SCALE, 80 FT. = 1 INCH. —



The fourth Plan contains several blocks which are not perhaps so involved as those already described, being chiefly notable on account of being occupied principally by drapers doing an enormous business. That facing the Hotel block, from which it is separated by a very narrow street, is occupied by two Drapery firms, employing about 300 hands and 200 hands respectively, separated from each other by imperfect party walls, and by a Wholesale Drapery Warehouse in several tenures. Adjoining this is another shop used for the sale and making up, on a large scale, of mantles, straw hats, and milliner's goods generally, a portion of the building being occupied as restaurant. These buildings form a block varying from three to five storeys in height, and are separated by a street, 50 feet wide, from a warehouse full of floor openings, and a large internal area, which is in turn adjoined by another Drapery and Fancy Goods Shop.

As I have already mentioned, the above instances of hazardous blocks are more or less typical of all the others, and to recapitulate, the chief points of danger in connection with these vast areas are faulty construction, excessive height, complexity of tenure, unprotected floor openings of all kinds, internal wooden linings to walls, external hazard one to the other, combustible roofs, and narrow streets. The question of how to cope with this state of things, which is certainly growing worse year by year, is one which will have to be faced sooner or later. City authorities seem powerless to deal with it, and as far as I can see it will have to be left to the Insurance Companies to effect a reform by a carefully thought-out scheme, whereby the worst points will be penalised by additional rates, as has been done in various other classes of risk with marked success. The objectionable features would probably gradually disappear under such a system. The provision of adequate private extinguishing appliances, including sprinkler installations in the largest risks, is also greatly to be desired.

I now come to another feature which is worthy of special mention, and that is the marked increase of risk which has taken place within recent years in connection with the

I would like to see the charge laid down by
Combination of Tariff under this heading vary more according
Trades. to circumstances, as there are many cases (some
of which will no doubt readily occur to you)

where, although less than 50 hands are employed, an extra rate would be well merited. The growing practice of Drapers, Stationers, Cycle Dealers, etc., keeping fancy goods and toys is worthy of special attention. The dressing of windows for the Christmas trade with light inflammable materials is an added risk, and I can recollect a case where a loss of over £2,000 took place, which was directly attributable to this practice, through an assistant lighting the gas in the shop windows which had been dressed with various coloured grasses, by means of a lighted taper. We very often find that in addition to the combination risk there are other hazardous features which are thrown in without apparently any notice being taken by the Insuring Office. Take, for instance, a risk which I came across a few months ago, where the tradesman was described as a Draper and Dealer in Household Furniture, Boots and Shoes, Ironmongery, Crockery, Carpets and Oilcloths. The rate charged was 6s., which included an extra for combination, and this was surely low enough, but in addition to all these the alleged Draper had a small joiner's shop at the top of the building, where he was supposed to repair furniture, but where in reality he manufactured it, employing four or five men for the purpose. It should not be forgotten that the rates given in the Tariff are the minimum ones, and that it is left to the Office to charge an extra for an additional hazard of this description.

I suppose that a paper on shops would hardly be considered complete unless at least some of the principal characteristics of the more hazardous of these were dealt with in detail, but as time presses I can only deal with a limited few. On casually turning over the leaves of a Directory the other day I found that there were upwards of 70 different classes of tradesmen, so I think that I cannot do better than follow the convenient classification of the Shops Tariff, dismissing at one stroke of the pen all premises which may be accepted under Class I., at the minimum rate of 2s., as being unimportant.

Class II. — Grocers, Ironmongers, and Hardware Dealers, Lamp Dealers, Cycle and Motor Car Dealers, Chemists and Druggists.—Although the minimum rate is still 2s., the question as to whether oil is stored is, of course, an important one, and as other classes of tradesmen also store and sell oil, I

propose to treat the whole matter separately later on. The ordinary grocer's shop without oil is one calling for no special attention, but the Italian Warehouseman, whom we might call an aristocratic relation of the ordinary grocer, has probably some machinery driven by a small gas engine, or electric motor for grinding coffee, currant cleaning, etc., coffee being roasted by means of the beans being placed in an iron cylinder, which is very often heated by gas.

The keeping of gunpowder by ironmongers and hardware dealers is a feature of the trade; and the powder should be kept either in metal tins or in an iron safe, and sold by daylight only.

It is as well to see in the case of *Lamp Dealers* that no lamps are used where the oil reservoirs are made of glass or porcelain, the use of such lamps often leading to explosion through overheating. The reservoirs should be constructed of metal only.

The addition to the Tariff of Cycle and Motor Car Dealers is a very recent one, no doubt on account of the growing practice of storing oil on the premises (for storage of petrol see under oils); Calcium Carbide is sometimes kept, but only in sealed tins. *Chemists and Druggists*.—Small quantities of benzine are allowed to be kept in sealed bottles, sold for removing stains, etc., without extra charge, any manufacturing which may be carried on being probably of a comparatively harmless kind. There should, of course, be a warranty inserted in the Policy against the use of a laboratory or still. It is worth noting that owing to the class of goods kept, some large chemists' risks nowadays partake very much of the nature of drysalts.

Class III.—Furniture Dealers, Haberdashers, Drapers (other than Woollen), Makers of and/or Dealers in Mantles, and Upholsterers.—I should like to see a few other trades added to this list, such as Tobacconists, Toy Dealers, and Fancy Goods Dealers.

Furniture Dealers and Upholsterers are frequently accepted at the minimum rate (3s. 6d.), where a considerable amount of repairing is carried on, and this is to be deprecated. The quantity of furniture polish kept, containing methylated spirits, is a point of interest, and the presence of unprotected gas lights in the packing department is a decidedly unfavourable feature on account of the straw in use.

Drapers and Haberdashers.—Many of the dangers in connection with these risks have already been pointed out, and I have little to add to what I have already said. I observe that a writer in the *Post Magazine* of the 12th September last suggested that a lower rate might be charged for the smaller draper's shops (amongst which should be included Scotch Drapers) with only a few hands, and that drapers employing say over twelve hands should be rated in a different fashion, commencing with a normal rate, extras being charged in the same way as in other Tariffs for such additional hazards as

- (1) Construction—other than first class.
- (2) Height or Cubical Contents.
- (3) Open wood staircases from floor to floor within the shop and showrooms.
- (4) Lighting, otherwise than by electric light with approved installation—or incandescent gas.
- (5) Heating.
- (6) Combination of trades. The carrying on of the business of a dealer in Toys, China, Crockery, and/or Furniture in conjunction with that of a Draper, the present minimum number of hands (50) no longer to be taken into account.
- (7) Number of assistants employed.

Further additions might be made to this list, such as a charge for timber linings to walls, etc.

Oilmen, Oil and Colourmen, Ship Chandlers.—These are advisedly bracketed together, although in many cases ship chandlers' risks might probably be considered the less hazardous of the three. The nature and quantity of the oils stored are, of course, the main points, and these may include benzoline, ordinary petroleum, and various vegetable oils, such as Linseed, Rape, Colza, and Olive, also lubricating oil containing probably a certain percentage of petroleum. In addition several barrels of tar are generally kept, also clean cotton waste, methylated spirit, and varnish, and possibly gunpowder, which should be stored in the manner described under "Ironmongers." Small ship chandlers selling only dry goods, consisting of various kinds of tinned foods, ropes, ironmongery, and such like, seem to me to be somewhat heavily rated at 10s. 6d., and were it not for the fact that they come under the Tariff they might possibly be

accepted at a lower figure. I presume the presence of a counter practically decides the question as to whether the risk is a shop within the meaning of the Tariff, but be that as it may, there are probably a number of ship chandlers who are considered to be wholesale dealers, and are rated as such, who would certainly not hesitate to sell a single article or a small quantity of some particular commodity if they were asked to do so by a customer. The difference, therefore, between such a dealer and one who only carries on a very limited retail trade would appear to be very slight; in fact, it is apparently a case of a distinction without a difference.

The keeping of a small quantity of oil may
Oils and their appear to some shopkeepers an inadequate reason
Storage. for increasing their rate from 2s. to 5s. per cent.,

but when the danger of handling such oil is fully understood the increase will be acknowledged to be reasonable. The oil, when not kept in an outhouse at the rear of the shop, is generally stored either in a back shop or in the basement, from whence it is drawn by a beer engine. In either case the floor below the tap becomes more or less saturated with the oil. If the droppings from the taps are not caught in small pans, sand (not sawdust) should be placed on the floor immediately below the taps. Indeed this should be done in any case.

The term "petroleum," to which the Acts of 1871 and 1879 apply, includes any rock oil, Rangoon oil, Burmah oil, oil made from petroleum, coal, schist, shale, peat, or other bituminous substance, and any products of petroleum, or any of the above-mentioned oils, and, so far as the Act of 1871 is concerned, meant such of the petroleum so defined as when tested gave off an inflammable vapour at a temperature of less than 100 degs. Fahr. It was seen fit, however, to alter this to 73 degs. Fahr. in the Act of 1879, and it is generally thought that a mistake was made when this was done. The Select Committee of the House the Commons which was appointed to deal with the sale, etc., of petroleum, in their report, dated 1898, recommended, amongst other things, that the legal flash point of petroleum oil be raised to 100 degs. Fahr. by Abel's closed test. The Petroleum Bill, incorporating the recommendation of the Committee, was however, rejected. That the flash point should be raised can hardly be doubted when one remembers that a temperature of 73 degs. Fahr. is frequently attained and some-

times exceeded in summer time and in shops during the winter months, and thus the possibility of an explosion occurring at such times, through the liquid giving off an inflammable vapour and meeting a naked flame, is considerable.

With regard to keeping large quantities of petroleum, within the meaning of the Act (the liquid being frequently called Petroleum Spirit) permission to do so must be applied for to the local authorities, but small quantities may be kept (without special permission) either for private use or for sale, provided the following conditions are complied with:—

- (1) That it be kept in separate glass, earthenware, or metal vessels, each of which contains not more than one pint and is securely stopped.
- (2) That the aggregate quantity kept, supposing the whole contents of the vessels to be in bulk, does not exceed three gallons.

Moreover, it is within the power of the local authorities to make such conditions as they may think fit as to the mode of storage, the nature and situation of the premises in which, and the nature of the goods with which petroleum, to which these Acts apply, is to be stored, the facilities for the testing of such petroleum from time to time, the mode of carrying it within the district of the licensing authorities, and generally as to its safe keeping. As a rule, however, it is required that the oil should be stored in one of the following methods:—

- (a) In a strong metal tank sunk into the ground at a suitable place and covered with earth or concrete, the tank to have no opening but for the pipes through which the petroleum is pumped.
- (b) In a concrete, stone, brick, or iron store (partially sunk into the ground where possible), the lower part so constructed as to form a tank capable of receiving, in case of accident, all the petroleum contained in the store.

The store to be ventilated sufficiently to prevent the accumulation therein of inflammable vapour, and all ventilating openings to be protected by strong wire gauze.

Insurance Companies are naturally very strict as to where petroleum spirit (very often known as benzoline) is stored, and it does not follow that the sanction of the town authorities will always be endorsed by them.

The storage of petrol for use on motor cars is becoming more and more common, and in consequence a new set of regulations were issued in March, 1903, "as to the keeping and use of petroleum for the purpose of light locomotives." As these regulations are of considerable interest at the present time, I give them *in extenso* :—

"In these regulations the expression 'petroleum spirit' shall mean the petroleum to which the Petroleum Acts, 1871 and 1879, apply, provided that when any petroleum other than that to which the said Petroleum Acts apply, is on or in any light locomotive, or is being conveyed or kept in any place on or in which there is also present any petroleum spirit as above defined, the whole of such petroleum shall be deemed to be petroleum spirit.

"In these regulations the expression 'storehouse' shall mean any room, building, coach-house, lean-to, or other place in which petroleum spirit for the purposes of light locomotives is kept in pursuance of these regulations.

"(1) The following shall be exempt from license under the Petroleum Act, 1871, namely :—

"(a) Petroleum spirit which is kept for the purpose of, or is being used on, light locomotives when kept or used in conformity with these regulations.

"(b) Petroleum spirit which is kept for the purpose of, or is being used on, light locomotives by, or by authority of, one of His Majesty's Principal Secretaries of State, the Admiralty, or other department of the Government, and which is subject to special regulations.

"(2) These regulations shall apply to petroleum spirit which is kept for the purpose of, or is being used on, light locomotives, and for which (save as hereinafter provided) no license has been granted by the Local Authority under the Petroleum Act, 1871, and shall not apply to petroleum spirit which is kept for sale, or partly for sale and partly for use on light locomotives, and which must be kept in accordance with the provisions of the Petroleum Acts as heretofore.

"(3) Where for any special reason a person keeping petroleum spirit for the purpose of light locomotives applies for a license under the Petroleum Act, 1871,

and the Local Authority see fit to grant such license, such petroleum spirit shall be subject only to Regulations 8 to 13, and the conditions of such license, in so far as the said conditions are not contrary to the said Regulations 8 to 13.

- “(4) Where a storehouse forms part of, or is attached to, another building, and where the intervening floor or partition is of an unsubstantial or highly inflammable character, or has an opening therein, the whole of such building shall be deemed to be the storehouse, and no portion of such storehouse shall be used as a dwelling or as a place where persons assemble. A storehouse shall have a separate entrance from the open air distinct from that of any dwelling or building in which persons assemble.
- “(5) The amount of petroleum spirit to be kept in any one storehouse, whether or not upon light locomotives, shall not exceed 60 gallons at any one time.
- “(6) Where two or more storehouses are in the same occupation and are situated within 20 feet of one another, they shall, for the purpose of these Regulations, be deemed to be one and the same storehouse, and the maximum amount of petroleum spirit prescribed in the foregoing Regulation shall be the maximum to be kept in all such storehouses taken together. Where two or more storehouses in the same occupation are distant more than 20 feet from one another, the maximum amount shall apply to each storehouse.
- (7) Any person who keeps petroleum spirit in a storehouse which is situated within 20 feet of any other building, whether or not in his occupation, or of any timber stack or other inflammable goods not owned by him, shall give notice to the Local Authority under the Petroleum Acts for the district in which he is keeping such petroleum spirit, that he is so keeping petroleum spirit, and shall renew such notice in the month of January in each year during the continuance of such keeping, and shall permit any duly authorised officer of the Local Authority to inspect such petroleum spirit at any reasonable time. This Regulation shall not apply to petroleum spirit kept in a tank forming part of a light locomotive.

- ' 8) Every storehouse shall be thoroughly ventilated.
- " (9) Petroleum spirit shall not be kept, used, or conveyed except in metal vessels so substantially constructed as not to be liable, except under circumstances of gross negligence or extraordinary accident, to be broken or become defective or insecure. Every such vessel shall be so constructed and maintained that no leakage, whether of liquid or vapour, can take place therefrom.
- " (10) Every such vessel, not forming part of a light locomotive, when used for conveying or keeping petroleum spirit, shall bear the words 'petroleum spirit, highly inflammable,' legibly and indelibly stamped or marked thereon, or on a metallic or enamelled label attached thereto, and shall be of a capacity not exceeding two gallons.
- " (11) Before repairs are done to any such vessel, that vessel shall, as far as practicable, be cleaned by the removal of all petroleum spirit and of all dangerous vapours derived from the same.
- " (12) The filling or replenishing of a vessel with petroleum spirit shall not be carried on, nor shall the contents of any such vessel be exposed in the presence of fire or artificial light, except a light of such construction, position, or character as not to be liable to ignite any inflammable vapour arising from such spirit, and no fire or artificial light capable of igniting inflammable vapour shall be brought within dangerous proximity of the place where any vessel containing petroleum spirit is being kept.
- " (13) In the case of all petroleum spirit kept or conveyed for the purpose of, or in connection with, any light locomotive, (a) all due precaution shall be taken for the prevention of accidents by fire or explosion, and for the prevention of unauthorised persons having access to any petroleum spirit kept or conveyed, and to the vessels containing or intended to contain, or having actually contained, the same; and (b) every person managing, or employed on, or in connection with any light locomotive, shall abstain from every act whatever which tends to cause fire or explosion,

and which is not reasonably necessary, and shall prevent any other person from committing such act."

Note.—From the above Regulations it will be seen that there are two methods in which petroleum spirit required for use in motor cars may be kept. The first of these will be the usual method, namely, to keep in accordance with these Regulations; but where a person finds that for some special reason he cannot observe one of the Regulations, 4, 5, or 6, he may resort to the second method, namely, to apply to the Local Authority for a license. In such cases the places will be examined by the Local Authority Officer, who will advise the Local Authority as to its suitability for license. Where a license has been granted, Regulations 4 to 7 no longer apply.

"In no case is petroleum spirit kept wholly or partly for sale exempt from the necessity of a license."

Reliable statistics in regard to losses are always

Losses. difficult to obtain, and this is the more to be regretted, seeing how important such information is.

In the present instance the difficulty has been enhanced, owing, as I have already pointed out, to the wide field covered and the multifarious nature of the risks comprised in the simple term "Shops." I am enabled, however, through the kindness of a well-known local firm of Fire Loss Assessors to present you with particulars of 410 shop fires which occurred during the five years from 24th November, 1898, to the 24th November, 1903, in the counties of Northumberland, Durham (including the town of Middlesbrough), and Cumberland. I am also greatly indebted to a colleague in Manchester for some valuable information relative to losses, etc., in the industrial section of Lancashire, and in regard to this I should state—

(1) The district referred to is that forming the South Eastern portion of the county, with a line drawn immediately north of the Ribble, from Clitheroe to Preston and thence South to Warrington.

(2) Only shop fires in towns having a population of 10,000 and upwards are dealt with.

(3) The particular classes of shops under review (excluding Co-operative Stores) are Drapers, Haberdashers, Hosiers, Milliners, Pawnbrokers, Smallware Dealers, and Tailors.

(4) The period under review is from January, 1895, till October, 1903, both inclusive—eight years and ten months.

No fire of magnitude has, I understand, occurred among the

above classes of shops, either individually or in combination, during the last ten years, and in this respect Lancashire would appear to have been an exception when compared with other large industrial centres. It may not be uninteresting to note that the total population of the towns above referred to is 2,715,000, and that there are 6,882 shops of the classes mentioned in these towns, the fires of any importance which have taken place therein numbering 277. The percentage of total number of such shops per 1,000 of population works out at 2·53, and the percentage of fires in such shops at 4·02. Out of an aggregate loss of £31,115, Manchester alone accounted for £15,009, there having been 127 fires out of 1,853 shops at risk, a very favourable experience indeed.

I may say I have a note of four fires of recent occurrence in Co-operative Stores in the above district, and the particulars are as follows:—

Amount.			Cause.
£9,350	..	..	Unknown.
11	..	..	Defective Hearth.
10	..	..	Live Coal Flying.
7	..	..	Lamp Overturned.

I should like to draw attention to the large number of fires caused through the use of naked lights, and also to the high percentage of "unknown" causes. I am afraid that not until Fire Inquests become the order of the day may we expect any sensible diminution in the percentages of fires whose origin is shrouded in obscurity.

Another fruitful source of danger apparently is to be found in defective hearths and flues, and so long as builders are allowed to go their own way in defiance of building regulations, we need expect to see no reduction in the loss ratio from these causes. In these days of almost universal electric lighting it is, however, pleasing to note that comparatively few fires would seem to have been caused by defective installations.

Before concluding, I should like to record my grateful thanks to all those who have in any way assisted me by supplying useful information, especially to those gentlemen I have already referred to, and also to Mr. C. E. Goad for his kindness in supplying me with the necessary plans. I am afraid it has been a case throughout of an old story retold, and I can only hope that the paper may not be considered more remarkable for its omissions than for anything it may contain.

TABLE SHOWING CAUSES

which occurred between 24th November, 1898, and 24th
Middlesborough).

TRADE.	CAUSES								
	Total Amount of Loss.	Total Number of Fires.	Smoking.	Gas in contact.	Lighted Matches or Tapers.	Defective Hearths or Flues.	Chimney on Fire.	Paraffin Lamp.	Boiling Tar or introduction of Hazardous Risks.
	£								
Drapers	27730	72	7	15	8	6	2	3	1
Stationers, Booksellers, &c.	26884	13			12				
Co-operative Societies	23560	12			1	4			1
Grocers	12838	76	8	4	16	13		1	
Tailors and Clothiers	3179	30		2	5	4		3	
Pawnbrokers	2708	17	3	3	3				2
Wine and Spirit Merchants and Retailers	2108	21	5		2	3			
Tobacconists, Hairdressers,	1956	22	4	3	3				2
Confectioners	1318	22		2	1	5		4	
Furniture Dealers, &c.	1199	11	1		4				1
Glass and China Dealers	1089	6		1	2				
General Dealers	1061	7	1				1	1	
Fancy Goods Dealers	938	6			1	1			
Cabinet Makers									
Undertakers, &c.	847	15		1	1	1	1		1
Boot and Shoe Dealers	830	11			1	4			
Bicycle and Machine Dealers	827	3							
Painters, Paperhangers, &c.	773	10	1		1	1		1	
Watchmakers, Jewellers, Silversmiths, &c.	549	7	2	1		1			
Chemists & Druggists	542	6			1	1			1
Ironmongers	524	9		1	2				1
Picture Frame Dealers, &c.	377	3							1
Wardrobe Dealers	299	5			2	1			
Cutlers	284	1							
Refreshment Rooms, Cafes Music Dealers, &c.	281	5	1				1		
Indiarubber and Leather Merchants	229	2			1				
Butchers and Pork Butchers	223	4		1	1	1			
Herbalists	116	9			1	1			
Fishdealers	54	1							
Fruiterers, Poultry and Game Dealer	34	2				1			
	9	2		1					
TOTALS.	113366	410	33	35	59	48	5	13	11
Percentage to total number of Fires			8.05	8.54	14.39	11.70	1.22	3.17	2.69

TABLE SHOWING CAUSES OF FIRES, ETC., IN RETAIL SHOPS

Occupied by Drapers, Haberdashers, Hosiers, Milliners, Pawnbrokers,
Small Ware Dealers, and Tailors, (excluding Co-operative Stores).

In Towns of not less than 10,000 inhabitants
in the industrial Section of Lancashire,

From January, 1895, to October, 1903.

CAUSE OF FIRE.	No.	Fires Percentage.	Losses. £	Losses Percentage.
		Total No. 277.		Total Am't £31,115.
Boiler Explosion	1	0.36	13	0.04
Burning Soot or Sparks down Chimney	3	1.09	429	1.38
Cinders or Rubbish—carelessness	3	1.09	38	0.12
Electric Light—sparks from	1	0.36	5	0.01
Electric Light—defective installation	2	0.72	46	0.14
Electric Lamp—contact with goods	3	1.09	22	0.07
Fireworks	2	0.72	372	1.19
Fireplace or Stove—sparks or live coal flying	11	3.97	596	1.92
Flue—defective	9	3.25	976	3.14
Goods in contact with naked light	46	16.60	1,475	4.74
Gas—defective fittings	1	0.36	9	0.03
Gas Stove—rubber tube igniting	2	0.72	104	0.34
Gas Jet—igniting woodwork	2	0.72	21	0.07
Gas—explosions or escapes	8	2.89	746	2.39
Hearth or Fireplace—defective	7	2.53	368	1.18
Incendiarism	2	0.72	120	0.38
Inflammable Spirit—using	1	0.36	16	0.06
Matches—using lighted—carrying or searching	11	3.97	166	0.54
Naked Light—carrying or searching	18	6.50	3,058	9.83
Oil Lamp—using or overturning	2	0.72	49	0.15
Premises adjoining—fire from	11	3.97	643	2.07
Rats or Mice	2	0.72	32	0.10
Stove—defective	1	0.36	35	0.11
Stove—overheating	2	0.72	417	1.34
Tapers—lighting up	10	3.61	246	0.80
Unknown	116	41.88	21,113	67.86
TOTALS.	277	100.	£31,115	100.

SOAP AND CANDLE FACTORIES.

By J. MASON GUTTRIDGE.

*A Paper read before the Insurance Institute of Bristol,
February 1904.*

THE manufacture of soap and candles can be traced several centuries before the Christian era. Plato, as early as 348 B.C., made reference to the use of soap, and I had the opportunity myself last year of examining the old Soap Factory Mill existing at Pompeii, in which the original rendering pans still stand in a remarkable state of preservation, notwithstanding an existence of nearly 2000 years, whilst candles found at Herculaneum may be seen at the British Museum. Candles have also for centuries played an important part in ecclesiastical worship, notably the "Feast of the Purification," part of the celebration of the Mass, consisting of a procession with lighted candles, hence the derivation of the word "Candlemas."

There also existed in Scotland an old custom consisting of the pupils presenting to the schoolmaster small offerings on the 2nd day of February, and Candlemas day is still retained in Scotland as one of the four "term" days.

The subject of soap and candles may appear somewhat prosaic, but the manufacture of these commodities is essentially a chemical operation, in which a high degree of scientific skill is essential to successfully deal with its constantly varying principles.

Although considerable quantities of soap were made in England in the 17th century, little advance appears to have been effected in its manufacture until the early part of last century, when the researches of Chevreul into the constitution of fatty bodies, and the production of soda from common salt by Leblanc, established the scientific and practical basis upon which the soap and candle industries are now conducted.

The chief raw materials used in soap-making are tallow, grease, and animal fats, and a great number of vegetable fats, notably

cocoa nut, cotton, and olive oils for "hard" soap, and the more fluid seed oils, together with fish oils, for "soft" soap.

Palm oil, which forms an important element in the constitution of certain soaps, is still more extensively utilised in the manufacture of candles; chemically it contains stearine used by the candlemaker, and olein, one of the constituents of lubricating oils and glycerine.

Soap-makers sometimes procure these commodities ready prepared for the soap-copper, but in the larger establishments some of the raw materials pass through the whole of the preliminary processes, such as rendering, distilling, bleaching, and refining, and I propose briefly to deal with some of these processes and the raw materials used, before describing the actual manufacture.

All neutral fats (animal and vegetable) contain a certain proportion of glycerine, and in the process of soap-making, the weaker base "glycerine" is incidentally displaced from the fat by the stronger base "soda," the remaining fatty acids combining with the alkali to make soap.

Tallow forms one of the principal fatty matters employed in the production of household soap. The cellular tissues of men and animals contain a concrete fat, and the term tallow is applied to this fat after liberation from the associated tissues, the process of separation being known as "rendering," and may be effected by the application of heat—

1st. Over an open fire, with or without the addition of a small quantity of sulphuric acid to the crude fat.

2nd. By steam-heat under pressure.

The rendering of fat by fire-heat may be done in an open pan at a temperature considerably above the boiling point of water, the mass being constantly stirred until the animal tissue dries and cracks, allowing the tallow to run out and become separable by mere straining.

This process (seldom used owing to the emission of offensive vapours and the liability of the fat to discolour) would become dangerous should the fat overheat and a boil-over ensue, consequently the arrangement of the fires under the boiler requires the careful attention of the surveyor.

To avoid the emanation of these offensive vapours, a series of large circular coppers or pans are occasionally employed, the tops of which are closed with helmet-shaped heads; suction flues, in rear of the highest point of the helmets, conduct the noxious

gases given off during the rendering process to a furnace fed with coke and heated to a white heat at the point of entry to the chimney stack, whilst the independent smoke flues connect each fire-place with the stack at a lower point than the furnace.

The fat, chopped fine, is introduced into the coppers with a small percentage of water, and constantly stirred until the tallow leaves the membranous tissues.

After the process is complete the fire is reduced and the tallow ladled out. Finally, when the fat has been further freed by compression, the residuum is converted into "greaves" by hydraulic pressure, and used for animal and poultry food.

Another method of rendering comprises the chemical destruction and opening of the cells of the fats by the agency of sulphuric acid and steam.

A suitable apparatus for rendering by steam consists of a steam-tight cylinder or "digester." Crude fatty matters are placed in the vessel, and open or close steam, sufficient to melt the mass, is applied, the liquid fat or tallow being eventually drawn off, and the residue, when close steam has been used, converted into "greaves."

The tallow after rendering, either by itself or in combination with other fats, now passes to the soap-copper.

Both palm oil or tallow may be bleached

Bleaching. atmospherically at a temperature of about 180° to 200° Fahr.

There are several chemical processes for decolourising palm oil (dependent more or less on the time required to perform the operation), but the one generally in use is a bichromate and hydrochloric acid treatment at a temperature varying from 120° to 130° Fahr.

Palm-kernel oil, though practically distinct from palm oil, has the same chemical properties, but the "olein" is employed in the manufacture of oleo-margarine, its bye-product being used for cattle feeding.

A large portion of the palm-kernel oil now used in commerce is extracted by the solvent action of bisulphide of carbon and steam after the seeds have been decorticated and separated from the husks. Olive oil residues, similarly treated, yield a greenish oil much used for soap-making.

Petroleum spirit may be used to extract both palm-kernel oil

and cocoa-nut oil, and great risk would occur in the case of explosion by contact of its vapour with air and flames.

Cotton-seed oil is sometimes extracted and refined by soap-makers in this country, generally by pressure and chemical treatment, the residuum being subsequently distilled.

Cocoa nut cut into slices and dried is known as "copra," and the extraction of cocoa-nut oil is usually by pressure and treatment in steam-jacketed pans.

The following are generally adopted in the manufacture of "soap":—

1st. Treatment of fats with definite quantities of alkali, the glycerine remaining with the soap, known as the "cold" process.

2nd. Treatment of fats with indefinite quantities of caustic soda and classed under the head of "hard" soap.

A few soap-boilers make their own caustic soda, but generally the carbonate of soda in a powdered state in bags, and caustic soda in drums, reaches the soap-maker from the alkali works, and when in a state of solution at a boiling temperature are causticised by the addition of fresh lime. In settling the insoluble carbonate of lime falls to the bottom, and the clear solution, "caustic soda lye," is drawn off for use.

The ordinary method of making "Household soap" is by a process of boiling in open pans, known as "coppers," heated by fire or steam, the former being now rarely adopted.

"Hard soap" constitutes the great bulk of soap used, and may be practically divided into three varieties, viz.:—Curd, mottled, and yellow.

When the "tallow" reaches the soap-maker ready for use, the fat is melted out of the barrels in which it is usually imported by jets of live steam injected through the bung-hole; the liquid fat falls into a tank underneath, and is pumped therefrom ready for use into the storage tanks.

In the first stage, called "killing the goods," a quantity of fat is run into the copper, which is provided with coils for supplying open and close steam, and caustic lye added until the mass becomes pasty.

In the second stage, when as much lye has been added as is convenient, the excess of moisture is precipitated as "spent lye" usually by the addition of common salt.

After standing for some hours the "spent lye," which contains the bulk of the glycerine from the fat, common salt and other sodium compounds, and the impurities of the fat, is removed, the glycerine and the salt being recovered in a future process.

In the third operation the granulated soap is boiled with fresh lye in order to complete saponification.

After settling, the lye, which still retains some strength and is called "half spent," is removed and used for the treatment of more fresh fat.

The method of finishing the soap varies with the kind required, and, briefly, is as follows:—

The finest quality is principally made from

Curd Soap. tallow, but other fats may be used. After the soap has been "made," as previously described, fresh lye is added and concentrated by means of close steam until the soap is hard and smooth, the boiling is discontinued and the soap, after settling, is removed to the cooling frames.

is practically curd soap, darker fats being

Mottled Soap generally used in its manufacture; the mottling is caused by the crystallisation of the different ingredients. The low-percentage mottled soap is generally finished by fire-heat.

usually contains rosin. The superior kinds are

Yellow Soap made from the best tallow and light-coloured rosin, the inferior qualities from similar but darker materials and bleached palm oil, the rosin being generally introduced in a powder when the soap is in a granular or open condition. After running off the half-spent lye, the next operation of fitting or refining is commenced, and free and close steam turned on, a clear, bright soap being finally produced, from which the impurities called "niger" have settled out.

The soap subsequently settles into three layers, consisting of (1) clear soap, (2) the "niger" or dark alkaline soap-lye used in the making of darker soaps, and (3) the dregs of lye.

On its way from the copper to the cooling frames the soap is mixed with some perfume in mechanical "crutching pots." One perfume somewhat extensively used in the cheaper soaps is an artificial almond oil known as the "essence of mirbane" or nitro-benzole. Mirbane, which is nitrated benzine (its chemical constitution having been changed), has a flash-point at about 210° Fahr.

After the soap has been allowed to harden in the cooling frames, which consist of large iron boxes, the sides of the frames are removed and the blocks of soap cut, first into slabs by means of a thin steel wire, and finally into bars. The bars, after being stamped with the name of the maker, are ready for dispatch to customers.

Certain soaps undergo a process called "filling" by the introduction of certain ingredients, notably "silicate of soda," which practically consists of flint, reduced by fire-heat and alkalies.

"Soft" soap is made with caustic potash instead of with caustic soda, the excess of moisture never being run off as with "hard" soap, consequently the percentage of fat is usually lower in "soft" than "hard" soaps. The oils are run into a copper, potash lye introduced, and the steam turned on. The boiling is continued, latterly by close steam or fire-heat, and lye added, until the soap appears clear on cooling and no liquid separates from it.

The base of toilet soap is generally a fitted
Toilet Soap. white soap of carefully-selected materials. The soap is reduced to shavings by revolving knives, placed in drying closets to remove the moisture, and then milled through granite rollers, the perfuming and colouring materials being added during the milling. The shavings are pressed to the required consistency for stamping by means of a "plotter."

The appearance of these soaps is generally due
Transparent Soap. to the use of methylated or some other spirit in their preparation, the alcohol being sometimes recovered for further use by distillation. Another process is by treating the soap with a mixture of sugar and glycerine at a temperature of about 175° Fahr.

Petroleum or paraffin may be utilised in the
Laundry Soap. manufacture of this class of soap, their presence facilitating the removal of greasy matter from linen goods.

GLYCERINE.

Few things in chemical history are more striking than the enormous development in the use of glycerine, which a few years ago was thrown away as a waste product, until Chevreul demonstrated that it existed in all neutral fats, and is now invariably obtained from the bye-products of soap and candle factories.

When the "spent lye" is removed from the soap copper it is pumped to the distilling-house, where, after being treated with muriatic acid and oxide of iron or other chemicals, it is evaporated in vacuo, until the salt is crystallised and falls to the bottom of the vessel, crude glycerine remaining. This crude glycerine is again distilled and extensively used in the manufacture of nitro-glycerine.

The glycerine sold for medicinal and domestic use is produced by further distillations.

The salt separated during the recovery of the glycerine is returned to the soapery for further use.

CANDLE-MAKING.

The more expensive kinds of candles are made with beeswax and spermaceti, whilst paraffin wax, and stearine made from tallow and palm oil, are amongst the principal commodities used in the composition of the candles in general use.

Beeswax, used for stiffening purposes in certain kinds of candles, is sometimes adulterated with various fats and cheap paraffin, and after being boiled in weak acid water the dross is separated by subsidence. Beeswax is bleached in a somewhat similar manner to palm oil.

Ozokerit or earthwax is a mineral product found in Galicia, and two processes are usually adopted to obtain its commercial products.

The first consists in dissolving the wax in some spirit, the solution being afterwards filtered through charcoal and finally distilled. The second and most usual process consists in the chemical treatment of the "ozokerit" and subsequent distillation with superheated steam.

Spermaceti may be broadly described as the residuum of sperm oil after filtration. Spermaceti candles usually contain a small percentage of wax or paraffin. The luminous intensity of the standard sperm candle is the "unit of luminosity," and explains the use of the phrases "candle gas" and "candle power" (electric light).

The bulk of the candles are made from paraffin scale or wax, pure paraffin being sometimes used alone for candle-making, but owing to its tendency to bend, even some time before melting

point is reached, it is usual to mix with it a proportion of hard stearic acid.

Paraffin scale is the solid portion from Scotch shale oil or American petroleum, and is generally imported by the candle-maker in casks, and removed therefrom by boring a hole in the cask and inserting a steam jet, the liquid mass falling into a vessel underneath, whence it is forced to elevated settling tanks, subsequently passing into the cooling rooms, where it is moulded into cakes.

In the next operation the "scale" is "sweated" in a cupboard heated with open steam sufficiently high to melt the soft paraffin, which, together with the oil, flows away, leaving behind a mass of hard paraffin wax.

This wax, after filtration through animal charcoal or Fuller's earth—or naphtha washings, followed by settling and decantation (the naphtha being recovered by distillation) may be adopted—is then ready for the candle-maker, the residuum being known as blue oil.

Tallow may be decomposed into stearic, palmitic, and oleic acids or glycerine, and, as already described, the glycerine is incidentally removed from the fatty acids in soap-making. Another method of converting dark fats into glycerine and fatty acids is by acidification and distillation, and is briefly as follows.

A mixture of palm oil and tallow is "digested" in a copper vessel, called an "auto-clave," with water and lime at a high steam pressure, the result being a dilute solution of glycerine (sweet water), and a mixture of stearic, palmitic, and oleic acids, partly in combination with the lime as the decomposing agent. The contents of the auto-clave are transferred to a tank whence the "sweet water" is drawn off, and the lime separated from the fatty acids by means of sulphuric acid. The fatty acids, which are dark in colour, are treated with sulphuric acid at a high temperature, and finally distilled by fire-heat and superheated steam.

The distillate is of a good light colour, and is used for composite or snuffless dip candles.

The next stage in the process is the separation by hydraulic pressure, at a low steam temperature, of the liquid olein or oleic acid from the solid fatty acids, technically stearine.

This oleic acid is used principally by woolworkers for oiling wool, the stearine being ready for the candle-maker.

Candles are made in three ways, viz., by basting and rolling, by dipping, and by moulding.

The first method, basting followed by rolling, is employed in the case of beeswax, which cannot be moulded satisfactorily on account of its contraction on cooling, and the tenacity with which it adheres to the moulds.

is used with tallow dips and snuffless dip candles, neither of which is easily extinguishable in a draught. The operation is performed by constantly lowering suspended wicks into heated tallow in a wooden box until the required thickness is obtained.

Candles consisting of paraffin wax and stearine are moulded; but before describing the process it may be observed that previous to the introduction of plaited wick almost all candles had to be snuffed, but the present use of plaited wick steeped in borax and sulphate ammonia, or some other solution, and thoroughly dried, ensures complete combustion.

The candle-moulding machine may be briefly described as an oblong cast-iron box, somewhat deeper than the size of the candles. On the top of the box are two troughs into which the tapered moulds are securely fitted and made watertight. Under the box is an iron plate known as "the rising table," which can be raised and lowered at will. Beneath the table is a fixed box to hold the bobbins; a steam and water pipe is attached to the cast-iron box for the purpose of heating or cooling the moulds.

This is an important branch of the candle-making industry, and the lights are made by pouring or placing the material into a paper envelope subsequent to moulding.

Wicks for night-lights are chemically treated somewhat similarly to candle-wicks, and, after being thoroughly dried, are, in some cases, drawn through melted beeswax and afterwards through a small-gauged hole in a warm iron plate.

The processes employed in ordinary soap factories may superficially appear exceedingly hazardous, but from the information I have been able to gather the initial danger of a fire does not appear to be abnormal, and has sensibly decreased with the introduction of steam-heated pans in lieu of open fire-heated boilers; still, the inflammable nature of the materials stored, and

the fatty and, to a smaller extent, resinous permeation of the floors, renders the question of fire extinction a most serious one.

A quantity of sand in metal bins, and of buckets filled with water, conveniently placed to check a fire at its inception, would seem to be imperative.

Incombustible floors are particularly desirable in the rendering and boiling rooms, and the practice of some firms of periodically scraping the fatty refuse from the floors is a commendable one.

When gas is used, a leaky joint from a fat-Lighting. conduit near a gas jet may prove a serious danger, and every precaution should be enforced to prevent fat from coming into contact with the flame. An electric-lighter for lighting up is most desirable.

The insulation may deteriorate through Electric Light. chemical action, vapours, or the percolation of oil to the india-rubber covering of conductors, with the possibility of subsequent leakage, and it is to be recommended that conductors be enclosed in galvanised-iron tubes hermetically sealed to prevent the admission of objectionable vapours.

In places where the atmosphere is free from acids, the conductors might be run as aerial lines upon porcelain insulators.

In dealing with a subject so complex, and presenting such multifarious hazards of varying degrees, the descriptions must of necessity be "sketchy." I have endeavoured, however, to direct attention to the more hazardous processes in the manufacture of soap and candles, leaving the surveyor to deal with other details after inspection, more particularly in connection with the colour printing and cardboard box-making departments, and sawmill risk often to be met with in the larger manufactories of this class.

SHIRT FACTORIES.

By JAMES M. SCOTT.

*A Paper read before the Insurance Institute of Ireland,
December 3, 1903.*

WHEN Shirt Factories are mentioned one naturally turns to Londonderry, which is, and has always been, the Shirt manufacturing centre in Ireland. The Maiden City has long been identified with the Linen Industry in Ireland, which flourished during the 18th and part of the 19th century, and the "Sprigging" Industry—recorded as short lived—filled the gap between the decay of the Linen Industry in the district and the commencement of the Shirt-making Industry.

"Sprigging" is a term now largely out of use and it means "Embroidering with representation of twigs."

"In 1802, Linen markets were held in Londonderry twice a week, and webs of linen to the value of £5000 and upwards in 'ready money' changed hands at each market" (*vide* Sir Robert Slade, the Secretary to the Irish Society in 1802, in a narrative of a journey in the North of Ireland).

In those days the workers spun the yarn on the old-fashioned wheels, and wove the cloth on hand-looms in their little cabins.

1840 is recorded as the year in which the Sprigging Industry was started, and about the same time a Mr. William Scott started the first Shirt Factory in 'Derry, at the corner of Abercorn and Carlisle Roads where, it is interesting to note, there are to-day two large Factories. The first order was from a Mr. M'Carter to send to a son in Australia. Shirt-making had been carried on chiefly, if not exclusively, in the homes of the peasantry, but in 1850 Factories and Workshops were started. In 1870 about 10,000 hands were employed in the 'Derry Factories and at the present day the number is at least 18,000. The industry has attained

great importance in the Northern counties—Londonderry, Donegal and Tyrone—and, including the number of women who work at home, it is estimated that not less than 80,000 persons are engaged in shirt-making. The trade is still flourishing, and in busy times the manufacturers' great trouble is the scarcity of female labour, it being difficult to get a large supply unless there is work in the neighbourhood for their male relatives.

In the Fifties there were five small Shirt Factories in Londonderry, and at the present time there are almost eight times as many with over 100 attendant rural branches, so that the industry is one of the greatest importance to 'Derry and the North of Ireland.

As I have mentioned, a Mr. Wm. Scott started the first Shirt Factory in Londonderry, and the hardy Scot—spelled with only one "t"—has always been prominent in industry in the North of Ireland, and it is recorded that "in 1850 two Scotch Boys arrived in Londonderry and established themselves there, each starting a Factory—one of them being the present William Tillie, Esq., D.L., and the other the late Adam Hogg." Both achieved a very great measure of success in their ventures, and the names of Tillie and Hogg are prominently identified with the industry at the present day.

To-day 'Derry city, which may be called the Capital of the Industry, is the great centre from which the trade of the United Kingdom, the Continent, and the Colonies "is supplied."

A Shirt Factory is usually a single risk, with the manufacturing and finishing processes all carried on under, practically, the same roof. Occasionally the Laundry and Finishing Department is contained in a separate one-storey adjoining building. The latter arrangement is, probably, preferable from an Insurance point of view, though in the actual Wash-house or Laundry processes, which are nearly all wet, there is not a great amount of extra risk. A substantially-built factory, with its many clean windows, has an air of smartness that is very noticeable, and when in 'Derry you cannot easily mistake it.

Nowadays an all Linen Shirt is pretty much a thing of the past. The Linen Shirt of to-day usually consists of Linen fronts and cuffs with Longcloth bodies. Longcloth is Cotton, and so are all the various styles of Print Shirt goods. Wool shirts are made of that material throughout with the exception of the neckbands,

which, for comfort, are made of silk or sateen. Wool shirts are sold as they are made, and do not require any Finishing process.

It might be stated that, as the human frame is pretty much the same all the world over, there is not any particular difference in the shape of Shirts. Possibly that intended for the Chinese Trade is the most notable exception, in being short in the Body and long in the Sleeves.

A White Linen Shirt is a very wholesome thing to look at when exposed for sale in a shop; a little troublesome at times to get into without disturbing the stiff front, but very cool and comfortable once it is properly adjusted on the person. A great many processes are involved in its manufacture, viz.:—1, Cutting; 2, Machining; 3, Country Work; 4, Wash-house; 5, Smoothing; 6, Boxing.

The cutting process is a simple one, and, according to the quantity required, the material is "hooked up" on the edge of long tables, then turned over on the flat on the top of the tables, the pattern having being pencilled on a single ply of cloth, which is placed on the top of the others. The larger parts of the shirts are cut out by hand with a large butcher's knife, which, properly handled, can cut through up to 80 ply at one time.

The smaller parts are cut on Band knives, which are long endless knives running at great speed over two wheels, the material, which is held together by metal clips, being drawn against the edge of the knife, which will cut up to 200 ply at a time. The various parts having been sorted together then go to the Machine Room, where the Body is hemmed, and the Fronts, Neckbands, and Cuffs put together.

There is an interesting little process in connection with the Fronts known as "pasting," the girls binding the different folds of the front with starch paste to hold them in their places for the machine in stitching process. The paste is put on in little dabs with a brush, and dried out with a Smoothing Iron.

The Sewing Machines are, in the larger Factories, worked by power, Electric or other, the work being specialised so that a shirt or its component parts may pass through many different hands in the machine room. For instance, a neckband undergoes three different processes, and so on.

The different machines in use may be classified as First-Stitch or Running Machines, Stitching Machines, Hemming and Button-

holing Machines. They are all on the same principle, and a Hemming Machine is provided with a little spring which turns over the hem (or outside edge of the cloth) and the needle does the rest.

There is now a break in the process, and the next operation is that called "Country Work."

It is a most interesting fact that, with the exception of hurried orders, not a single Shirt is completed inside the four walls of a Shirt Factory. After the Machining process last described the various parts of the shirt are parcelled up and go to the outside Country Agents or Branches, where they are distributed amongst the home workers, who put the parts together and complete the Shirts on the Sewing Machines in their own homes.

This arrangement enlarges the labour field of the Factories, economises space, and is of great value to the country round about the Factories, spreading as it does many hundreds of thousands of pounds in wages, and providing many hands, that otherwise in Agricultural Ireland would be idle, with clean, profitable, and congenial, if I may use the word, employment.

It also creates a multitude of little Shirt Factories—in the meaning of the Tariff—which, I am afraid, when insured are taken at dwelling-house rates and involve a breach, but not a grave one, of the Tariff.

When the Shirts come back from the Country Workers they are ready to undergo the process of Laundrying or Dressing. I am still dealing with the White Linen Shirt, and you will notice the number of processes that it still has to undergo before being placed on the market.

Roughing or Steeping is the first—the bundles of shirts being placed in a large revolving wooden wheel divided into quarters, the Shirts getting a fall under a mixture of soap and water, the object being to loosen the dirt in the material. From this they pass to the Boiling Wheel, which, practically, is a Steam heated Chest with a perforated metal cage revolving inside. The revolutions are varied in order to toss the Shirts about. They are Boiled, and at the same time undergo a *Bleaching* process in this operation.

After Boiling and Bleaching, a certain proportion of the Bleaching Chemicals remain in the Shirts, and these are extracted in what is called a Dash Wheel. This is practically the same process as Roughing or Steeping, the only difference being that the Shirts get a fall under clean water only.

The Hydro-Extractor is then brought into operation. This is a perforated cage revolving at great speed in a metal cylinder, the object being to extract the surplus moisture by centrifugal force from the shirts. The next process is Blueing, the same as at home, but on a larger scale, and then back again to the Hydro-Extractor.

Starching follows, Boiled Starch being forced, as I may call it, into the Shirts by a Rubbing Machine process, after which Drying follows in the Drying Chambers, which are constructed of metal. The Shirts are placed on Metal Horses, hung so that they can be pulled in and out of the Drying Chamber, and the workers do not require to go into the chamber itself.

The average heat in the chambers is about 120° (Fahr.), and the chambers are heated by air which is drawn through a steam-heated cylinder or chest, a forced draught being employed where quick work is necessary. After Drying comes a finishing Starching which is done by hand and, assuming that the Laundry is a separate building, the Shirts are now ready to go back to the Smoothing Room in the Factory proper.

We are all familiar with the ordinary Flat and Box Iron at home, but a "Gas-heated Smoothing Iron" is different. The Iron itself is of the familiar shape, hollow, and containing a little Asbestos fibre which equalises the heat over the whole surface of the Iron. The Iron is served by two tubes, one of which conveys the Gas and the other the compressed air, which mixes with the Gas before entering the Iron. Metallic Tubing is generally used, but sometimes we still find Rubber Tubing in use.

The Shirts are distributed amongst the Smoothers, and after Smoothing they are carefully examined and some particular styles passed to the Polishing Iron, which is heated on the same principle as the Smoothing Iron but is minus the asbestos fibre in the centre. The Polishing Iron is smaller than the Smoothing Iron, and the Polish or Gloss is improved by an ingenious spring arrangement whereby extra pressure is put on the Iron. After Polishing they go to Finishers, whose business it is to improve the general appearance of the articles before Folding. The Folders arrange the Shirts in the manner in which they are found by purchasers, and then comes a final examining, after which they are carefully packed in Cardboard or Wood Boxes (which in almost every case are made outside) for dispatch to customers.

This I think ends "The Tale of a Shirt" from a manufacturing

point of view, and you will agree that the Shirt Makers do their part of the work in a careful and thorough manner. Of the life of the Shirt later, and particularly of its dangerous adventures in a common Laundry, much could be written, but that is not my province to-night.

In this paper I have confined myself to a Shirt Factory proper, and have made no reference to the many allied Trades which are included under the heading of

THE SHIRT FACTORIES TARIFF.

"Buildings wholly or partly occupied as Factories, and/or Workrooms for the Manufacture or Finishing of Shirts, Shirt Fronts, Collars, Cuffs, Handkerchiefs, Aprons, Pinafores, and Underclothing in Ireland.

"The Hemstitching of Handkerchiefs is included in the term manufacture or finishing of Handkerchiefs.

"Risks situate in Belfast and within five miles of the Commercial Buildings, and rateable under this Tariff, are in no case to be charged less than the rates which would be chargeable for them if they are rated as Warehouses under the Belfast Warehouse Tariff."

This is a full and comprehensive heading, and indeed it is so difficult to get away from it that I am doubtful, as an Insurance man, whether my own house, with its single Sewing Machine, should not be declared a Shirt Factory under the Act—I mean the Tariff. Hemstitching Factories, Underclothing Factories, Cuff and Collar Factories all form an extensive class in which the principal features of risk, such as Boiler, Steam or Gas Engine, Sewing Machines and Smoothing Irons, and the Processes such as Machining—either Hemstitching, Hemming, or Buttonholing—and Laundrying or Finishing, are pretty much the same throughout. The Fire Hazard in a substantially built, properly equipped, and carefully managed Shirt Factory should not be great, and as a matter of fact the record of the 'Derry Factories has been very good. Of course, where the buildings have not been originally intended for Factories but have been converted for that purpose the risk is greater, and the utmost care in inspection is necessary. The principal points of Hazard may be pointed out. When the Gas Engine or Boiler is inside particular attention must be paid to the protection of the exhaust pipe of the Gas Engine and the keeping of the oily waste, which should be in a

metal receptacle. The crown of the Boiler should be at a safe distance from the ceiling overhead, and no Drying done or inflammable material allowed to accumulate on the top of the Boiler. The proper disposal of ashes should be insisted upon.

The tendency to use Electro-motors for Power purposes is a distinct improvement from our point of view, but, of course, in the smaller centres the Electricity must be generated on the premises, usually involving the use of a Steam Boiler and Engine. High-pressure Heating we are not likely to come across; low-pressure steam or hot-water pipes being commonly in use. As regards Oil Stoves, if they are encountered there is only one course open, to my mind, in dealing with same, and it is to quietly but firmly try to get them removed. They do not, however, often occur.

Drying is often carried on by means of the Closet or Chamber already described, or by Steam pipes. Smoothing Irons and Machines are, of course, invariably found in risks of importance. The Lighting charge applies more to risks situate in the outside country districts, but in all cases Electric Installations, Gas Brackets, and Oil Lamps should be carefully examined.

Extra Trade Tenancies are found in connection with the smaller Factories in 'Derry, but more often in Belfast, and occasionally in the outside country districts.

Printing on Textile Fabrics exists more in the Tariff than in fact; I have not, personally, ever met with it, and the extra of 2s. 6d. per cent. in any case would be prohibitive.

Two shillings per cent. extra for the making of Boxes or Cases leads to the removal of this objectionable feature of risk. The extra applies to both Cardboard and Wood Cases.

Cleanliness in all departments, careful management, safe Lighting and Heating, absence of crowding, the daily clearing up of waste in the Factory and/or Workroom, as provided for in the Tariff, are all essential features of a good risk.

Standard Fire Resisting Buildings will hardly ever be found rateable under the Tariff, for the reason that Shirt Factories, like Linen Warehouses and Making Up Rooms, require a maximum of light, and, consequently, the window space is greater than allowed under the F.O.C. Rules for Standard Fire Resisting Buildings.

In the old days, before the issue of the Tariff,
Rates. Shirt Factories were freely accepted at 2s. 6d. per cent., and when we think of a £20,000 or £30,000, or even a £40,000 risk with a Boiler or Gas Engine inside, Sewing

Machines worked by power, Smoothing Irons, and occasionally Boxes or Cases made, it must be confessed that the Offices did not, apparently, leave themselves much margin for profit. Nowadays we get fair rates, the average running from 5s. 6d. for the best possible Factory of any size worked by Electro-motors, or with the Boiler or Gas Engine in a Fire Proof compartment or outside. I do not know of any Tariff about which there was so little grumbling on the part of the insured as this one. Indeed, the general opinion is that the Shirt Factory Tariff is a very good one.

When rating Shirt Factories or similar works in Belfast the Belfast Warehouses Tariff applies, and under it very much higher rates are obtained. The differences in the two Tariffs are interesting and may be touched upon. In the Warehouses Tariff a Felt roof is charged 3s. per cent., and in the Shirt Factories Tariff 2s. per cent. is deemed sufficient. The Shilling in favour of the Shirt Factories Tariff is taken off by a charge of 2s. thereunder for a Gas Engine or Boiler inside (not in a F.P. compartment with an Iron Door), which item passes in Belfast at 1s. Power in the Warehouses Tariff is charged 3s. 6d., and passes in the Shirt Factories at 1s. Tenancies are nominally the same in both Tariffs, viz., 6d. each, but in Belfast the normal is increased by 1s. where there is extra tenancy.

A high building in Belfast is charged 1s. for each storey over five, but 6d. is the extra in the Shirt Factories Tariff. Drying by Artificial Heat carries 1s. in each Tariff. The Hands, Boxes, or Cases extras in the Shirt Factories Tariff are not found in the Warehouses Tariff, which, however, makes up more than the difference by a series of items such as Floor Openings 1s., Wood Linings 1s., Exposure 1s. The printing on Textile Fabrics and Pipe Stove charges are the same in each Tariff. In Belfast, however, Oil Stoves are "Special."

The question of a proper separation from the adjoining buildings is differently dealt with. In Belfast the Party Wall must be carried through and at least 2 feet 6 inches above the roof, and under the Shirt Factories Tariff the wall need only pass through and above the roof.

These points of difference are interesting and rule against a Belfast Factory, the best being charged about 10s. 6d. per cent., viz. Normal 4s., Irons 1s., Power 3s. 6d., Linings, Openings and/or Exposure 2s., against the 5s. 6d. in the country, viz. Normal 3s., Power 1s., Irons 1s., and Hands 6d.

Under the Shirt Factories Tariff no allowance is to be made for any Fire Extinguishing Appliances without Sprinklers. This, I consider, is a question of Appliances. that should be considered by the Offices. I have not yet come across a Shirt Factory with sprinklers, and taking into account the heavy initial cost of a sprinkler Installation (with the necessary adjuncts in the way of ordinary appliances) as compared with the saving in premium represented in a 25 per cent. allowance off the rate, and also coupled with the difficulty of having an adequate water supply in country districts, I do not think that there is much hope of the early introduction of Sprinklers. For instance, a £50,000 Shirt Factory is a very substantial risk, and at 6s. 6d. per cent. the 25 per cent allowance could only mean a saving of about £40 per annum to the Insured, which would scarcely show 5 per cent. on the outlay.

Under these circumstances, would not an allowance for ordinary Appliances in Londonderry and the Country Districts be for the joint benefit of the Offices and the Insured?

In the Belfast Warehouses Tariff, which applies to Shirt Factories within five miles of Belfast, provision is made for the extension of the Fire Extinguishing Appliances allowance on Mills and Factories, or other manufacturing risk, to Warehouses situate on the manufacturing premises.

There is no such provision under the Shirt Factories Tariff, and often we come across a Shirt Factory risk closely allied with and on the same premises as a Weaving Factory or a Bleach and Dye Works, and it will puzzle the most ingenious Insurance man present to explain satisfactorily to the Insured why we can give an allowance for Fire Appliances on the Weaving or Bleach and Dye Works portion of the Works and not on the Hemstitching part. I would not suggest a Fire Extinguishing Appliances allowance in a centre like Belfast, which has an organised Fire Brigade with Headquarters and Divisional Stations; but in Country Towns a Hand Pump, Extincteurs, or Buckets filled with water might prove of great service in stamping out a fire in the early stages, and their introduction should be encouraged.

In an earlier part of my paper I have referred to the good record of 'Derry City, but when we leave 'Derry City, however, we find that the fire record in other Districts and in Belfast has not been nearly so good. There have been very severe fires in Belfast in Hemstitching Factories within recent years. In fact,

a couple of smart losses have occurred in the present year, one being clearly caused by an accumulation of waste material round the Electro-motor, the latter sparking and starting the trouble. In the Country Districts, one at least fair-sized Factory has been completely gutted within the past eighteen months, and when a fire gets a proper hold of a Country Factory, we can only hope that our Policy on same is either non-existent (to use our expression commonly called an Irishism) or not too large.

In conclusion, I must express my thanks to my 'Derry friends in the Shirt Factory Trade for the full and free information afforded me on all points, and I have gained most useful details of the early history of the Trade and statistics of its present condition from that most interesting and useful publication: "Ireland: Industrial and Agricultural."

PRINTERS' RISKS.

By D. M. CAMERON.

*A Paper read before the Insurance Society of Edinburgh,
February 2, 1904.*

WHEN we consider the vast amount of Insurance literature and the forms of endless variety that pass through the press year by year, it is no exaggeration to say that the printing trade is veritably the handmaid of the Insurance business in all its branches. To an Insurance man, therefore, that trade should possess an interest that can be claimed by no other, and possibly for that reason and on account of the benefits it has conferred upon the Insurance world—to the mutual advantage of both, be it said—the Fire section of the business has extended more leniency to printers' risks than is probably warranted by the facts recorded in the Fire Loss Registers of the individual Offices.

From a Fire Insurance point of view the trade is an important one either for good or ill, and it was to be expected that, sooner or later, the Federation of Insurance Institutes would desire that a paper on the subject should appear in the "Federation Journal." Such a paper has now been called for under the title of "Printers' Risks."

It will be readily granted that the city of Edinburgh can justly claim to be one of the most important centres, if not the most important centre, of the printing trade in the United Kingdom, and it is therefore not inappropriate that to the Insurance Society of Edinburgh there should have been allotted the preparation of a paper dealing with that trade in its relation to the subject of Fire Insurance.

The title of the paper is open to the criticism that it is vague; indeed, the editor of a trade journal has written enquiring if the subject to be dealt with is the "terrestrial fire risk" in printers' premises. The reply was in the affirmative, and you will probably

agree that the consideration of the other risks suggested by the enquiry must be postponed indefinitely.

This vagueness confers the delightful privilege of freedom. The entire field of the printing and allied trades is so wide that it would require many papers to adequately deal with the subject, and taking advantage of the freedom conferred by the title I have decided to confine myself chiefly to the branch known as "Letterpress Printing." Some slight references to other branches are necessary, but these will be of a fragmentary character.

When one begins to consider carefully what there is worth saying regarding printing risks from a purely Fire Insurance point of view, it soon becomes apparent that, save as regards a very few points, there is little of exclusive application but much that is common to all risks in which power-machinery is used. I may be wrong, but rather than repeat what has been said over and over again, it seemed that for our younger members contemplating the Examinations of the Institute it might be profitable to devote a considerable part of the paper to printing processes, more particularly in letterpress printing, making reference in passing to any special point of hazard that might suggest itself.

The history of what has been fitly termed "The Historical. Divine and Noble Art of Printing" develops an increasing fascination the more it is studied. A few brief notes indicating the gradual development of the trade which to-day has attained such gigantic proportions must suffice for my present purpose, but I would commend the subject to the attention of the "hobbyless" Insurance man anxious to find an interesting occupation for the all too brief interval of leisure to which most of us are looking forward between the maturing of our Endowment Policies and the emerging of claims under our Whole-Life Policies.

Printing in its earliest form consisted in taking impressions from engraved blocks, and there is evidence that such printing was practised by the Assyrians, the Babylonians, the Egyptians and the Chinese many centuries before it came into use in Europe. A crude attempt was made to originate the Art in England about the end of the fourteenth century by printing playing-cards from wooden blocks, the transition to book printing developing gradually.

The question as to who invented the use of separate types was

for centuries the subject of fierce controversy. At one time the credit was claimed on behalf of one Laurence Coster of Haarlem, who, about the year 1420, was said to have cut out letters in beech-bark, from which he took impressions for the amusement of children, but it is now generally conceded that the invention was really the work of John Guttenberg of Mentz, who, about the year 1450, published the world-famous Mazarin Bible printed in Latin from cut metal types.

The art spread slowly to the various European countries, and was introduced into England by Caxton, who, after having printed several works on the Continent, issued from his press in the precincts of Westminster Abbey on the 18th November, 1477, a folio of 76 leaves, entitled "The Dictes and sayings of the Philosophers."

It was not until 30 years later that the art extended to Scotland. As a matter of fact it was on the 18th September, 1507, that James IV. granted a patent to "Walter Chepman and Andro Myllar, burgessis of our burgh of Edinburgh." Chepman seems to have been a wealthy merchant, who became at a later date the Dean of Guild, and this worthy apparently financed Myllar, a practical printer, who had acquired his knowledge of printing at Rouen. Chepman and Myllar set up their press in a house at the foot of Blackfriars Wynd, in the Southgait or Cowgate, and in April, 1508, issued therefrom eleven pieces of popular metrical tales of England and Scotland, and in 1509-10 there followed the better known "Aberdeen Breviary."

The earliest work from the Irish press appears to have been printed in Dublin in the year 1550.

The progress of the art of printing in England during the Tudor and Stuart periods was much hampered by severe repressive action on the part of Church and State.

For example, in 1566 Queen Mary granted a Charter of Incorporation to the Worshipful Company of Stationers—a close Corporation which, owing to the greed of its members, exercised a baneful influence on the trade. Queen Elizabeth, six years after coming to the throne, signed a decree passed by the Star Chamber requiring printers to enter into stringent recognisances for their good behaviour. In 1586 the same Queen by another Star Chamber decree restricted all printing to London and the two Universities, and empowered the Archbishop of Canterbury to reduce the number of printers in London as he should think

fit. By still another Star Chamber decree of 1637 the number of printers in London was restricted to twenty, and the number of their presses was strictly defined, three for each printer being the maximum number allowed. Again, in 1662, repressive legislation enacted that the number of London printers be twenty and type-founders four. These repressive measures were often rigorously administered, and disobedience was punished by fines, imprisonment, mutilation, and even by the death penalty. Of printing it is eminently true, in the words of Kipling,

"All we have of freedom, all we use or know,
This our fathers bought for us long and long ago."

The great fire of London in 1666 destroyed at least eight printing establishments, and we find that in 1668 there were in London only twenty-nine printers employing some 60 or 70 presses.

With the dawn of the eighteenth century came a brighter era. State interference ceased, monopolies were broken down, and under the fostering influence of a large measure of Free Trade rapid advance was possible: The paper duty and the newspaper tax were not repealed until later, and when they were removed a still greater impetus was given to the trade.

One of the most flourishing London printers at the beginning of the eighteenth century—William Boyer—had his printing office burned to the ground, a number of valuable works perishing in the fire. Fire Insurance being then almost non-existent a public subscription totalling to £2539 was raised for his benefit, and he started business again, using as a device to commemorate the conflagration a Phoenix rising from the flames. It would be interesting to enquire whether any connection exists between this item of history and the adoption of the same emblem by a well-known Office established some seventy years later. Possibly the venerable talking-bird which appears to have recently visited its new Temple in Lombard Street could throw some light on the subject.

In November, 1814, the *Times* was first printed by steam, and that application of steam power to printing machines marks the real birth of that industry which in the United Kingdom can to-day boast of probably over six thousand establishments. The enormous growth of one branch of the trade—the newspaper press—will be realised, when it is stated that in the year 1903 the

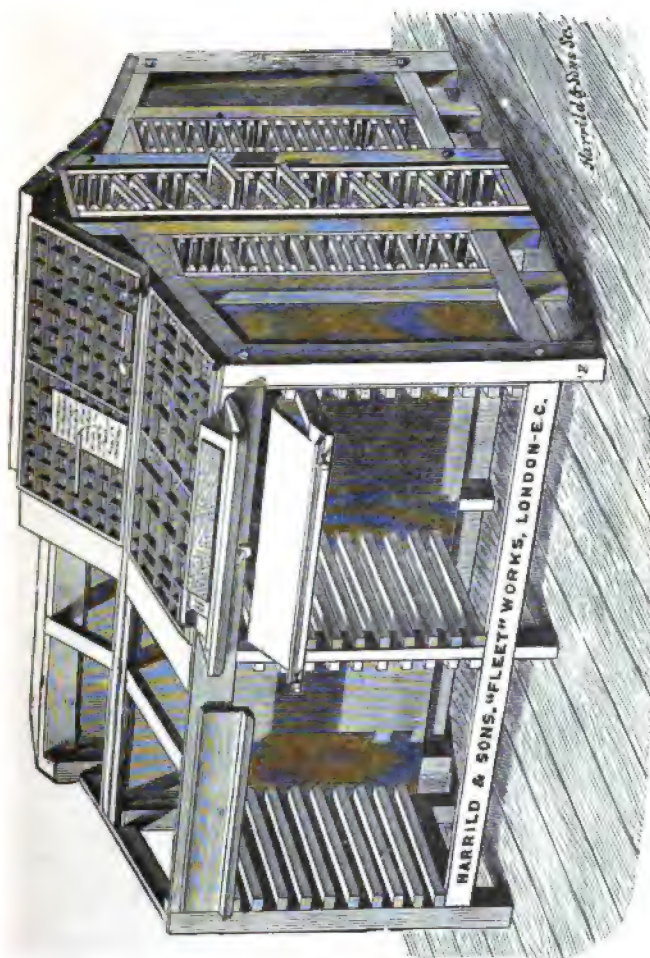


Fig. 1.—FRAME.

number of newspapers issued in the United Kingdom was 2431—241 being dailies. The latest figures I have been able to obtain show that 173,500 persons were engaged in work connected with books, prints, and maps in the United Kingdom.

MODERN PRINTING.

Printing as practised to-day may be considered under three divisions :—

1. Letterpress printing,
2. Copperplate printing,
3. Lithography,

and it will be convenient to consider each branch separately.

LETTERPRESS PRINTING.

The first stage in the production of printed matter is of course the setting up of the type. This is called composing, and is carried on in the composing room, usually termed the caseroom. Everyone is familiar with the metal types in general use and no detailed description is necessary, but it may be stated that the metal in which the type is cast is, as a rule, an alloy of lead, antimony, and tin, with sometimes a slight addition of copper.

The caseroom is furnished with rows of wooden frames (Fig. 1), the top of each being fitted with two wooden trays or "cases," subdivided into compartments or boxes of varying size, one box being allotted to each letter, stop, or space of the particular fount or style in use at the moment.

It is interesting to note that the boxes, at anyrate in the lower case, are not arranged alphabetically, but the larger boxes containing those letters most in request, such as e, a, t, i, n, o, s, h, and r, occupy positions nearest to the hand of the compositor, who, with his "copy" before him, sets up the matter, letter by letter, in a small metal frame, termed a composing stick, held in his hand.

When a few lines have thus been set, they are transferred to the galley (Fig. 2)—a tray of wood or metal, which lies on the frame at which the compositor stands—and at the proper stage the matter, if it be book-work, is made up into pages of the requisite size, and removed to the imposing stone—a table with

a stone or iron slab on its upper surface—on which the pages are locked up by means of wooden or metal wedges in iron frames, termed “chases.”

The forme (Fig. 3), as it is called, is now placed on a hand press (which will be afterwards described) and a proof taken, in order that errors, etc., which have escaped detection in any previous rough proofs, may be rectified.

In what is known as “jobbing work,” large wooden types may be used, but they can be locked up in the chase with the metal type, and where diagrams or illustrations are required the wood-cut, electro, or process-block is inserted in its proper place in the forme.



Fig. 2.—GALLEY.

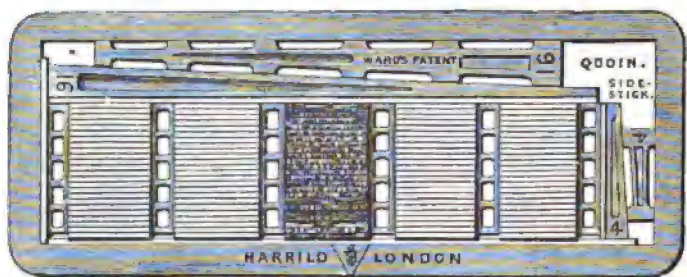
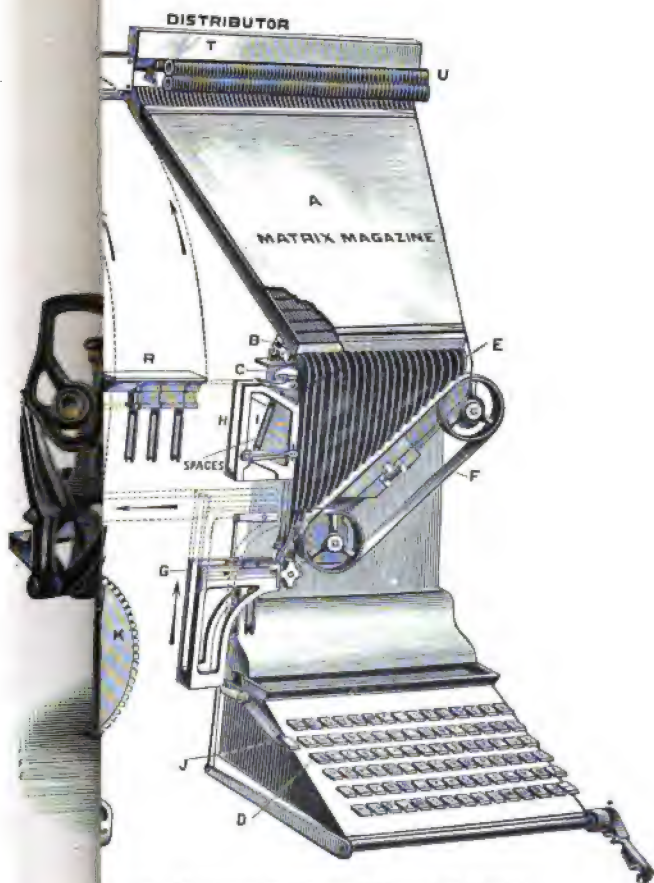


Fig. 3.—FORME.

In a caserom where hand-setting only is practised no process-involving any special fire hazard is carried on, but certain elements of risk present themselves.

If the printing office be a storied building, it is probable that for several reasons, one being the necessity for good light, the caserom will be found on the top storey, and as the aggregate weight of type metal in a caserom of any size must be very great, the strength or lack of strength of the walls and the joists or girders carrying the floor, may be important factors in restricting or increasing the damage resulting from an outbreak of fire.



TYPE MACHINE (Outline of Principal Parts).

g-Pot.
urning and dis-
rices to the

The position of gas brackets and pipe stoves are points which a careful surveyor will not fail to note; nor will the condition of the room as to cleanliness escape observation. The open type cases naturally collect much dust, which is periodically blown off by hand-bellows. A compositor's idea of cleanliness is luckily not universal, as it used to be said that a caseroom towel was not considered soiled until it could stand alone!

When a serious fire does arise, it will be evident that the loss cannot be measured merely by the quantity of type destroyed or damaged—the salvage from which will be of some value—but the labour which has been expended in setting-up work still standing, and the cost of sorting the tons of “pie” among the debris, will form heavy items in the claim. The importance, therefore, of storing as much standing matter, plates, stereotypes and electros as possible in a strong-room provided for the purpose will be apparent.

During the last half-century much inventive Type-setting genius has been devoted to attempts to substitute and Type- mechanical type-setting and type-casting for the casting by slow, laborious hand process we have just been Machinery. considering, and these efforts have proved so successful that in most large offices there are to be found in use several of the various ingenious machines which have passed from the experimental into the practical stage.

Some machines operate on the ordinary separate types supplied by the type-founder, and the function of the machine is merely to select and arrange the type to the requirements of the compositor; the type, by means of a supplementary machine, being afterwards distributed so as to be ready for subsequent use.

These purely composing machines, although still in daily use in the *Times* office and probably in other offices, are not so often met with as machines which not only set the type but cast it as well, both processes being carried out practically simultaneously.

Machines of the Linotype class (Figs. 4 and 5), through the operation of a key-board similar to that of a typewriter, collect a set of matrices or moulds sufficient for a line of words, spaces, etc., of the length required, and from these moulds cast the line in one solid bar. These bars are delivered by the machine in proper sequence to a “galley,” from which, as they accumulate, they are collected by the operator to be made ready for the printing machines.

The matrices pursue a circulatory course through the machine, starting from the mouth of the magazine, and passing downward to the line in which they are assembled; thence to the mould, to produce the letters on the Linotype, and finally back to the distributor-bar, from which they fall into their proper grooves in the magazine. It is this circulation of the matrices, and the fact that the operations of composing one line, casting from another, and distributing a third, are carried on concurrently, and without interference, that enables the machine to operate at the amazing speed of from eight thousand to twenty thousand "ens" per hour.



Fig. 6.—MONOTYPE KEY-BOARD.

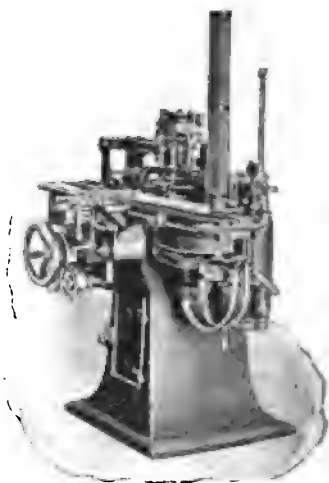


Fig. 7.—MONOTYPE CASTING MACHINE.

Machines of another class, such as the Monotype, cast the type singly and deliver it to the galley in line lengths, properly spaced and punctuated, but to accomplish this two separate machines are required. The machine first used—the key-board (Fig. 6)—is not unlike the familiar typewriter, at which the operator, with his "copy" before him, by depressing the keys, letter by letter, thereby punches a series of holes in a ribbon of paper fed from a reel through the machine. The prepared ribbons are then taken to the Casting Machine (Fig. 7), where complicated mechanism brings the perforations in the paper ribbon into conjunction with the corresponding matrices, and produces line lengths of composed single types

In many offices where machine type-setting is not practised, it may, however, be found that type is cast on the premises by one of several of the ingenious machines recently invented for the purpose. In several establishments in Edinburgh these machines may be seen at work, and it is a matter of general knowledge that the *Times* newspaper is printed from new type every day, the distribution of type after use having been discontinued.

These various machines will be discovered in a variety of situations, and if the installation be on an upper storey, say in the caseroom, the sufficiency of the floors becomes a question for consideration. A Linotype machine weighs about a ton, and as the equipment of a large office might easily run into twenty machines, the importance of the weight-carrying capacity of the floor is apparent. It is recommended by the manufacturers that the floors should be constructed to carry three cwts. to the square foot.

The heating of the type metal is accomplished within the machines by means of gas burners attached to flexible rubber piping, and some at least of the dangers inherent in this method of conveying gas will no doubt occasionally assert themselves.

It is convenient at this point to note some incidental processes and features connected with the subsequent operations in letterpress printing.

The constituents of the various printing inks used **Printing Ink.** in letterpress printing, and the processes followed in their manufacture, would prove an extremely interesting subject for a separate paper, but we only pause to say that the better qualities of black ink are made from lamp-black and linseed oil, the latter having been boiled at such a high temperature that it has become converted into a colourless varnish; but in some of the cheaper kinds of ink the vehicle carrying the colour may be a mineral-oil product to which resin has been added. With the presence of such compounds in considerable quantities in drums, on the machines and on the printed sheets, it need occasion little surprise that outbreaks of fire in printing offices so often rapidly develop into serious disasters.

The vehicle carrying the colour, in coloured inks, is much the same as that used for black inks, while the pigments used in their preparation are often derived from mineral substances, but during recent years coal-tar products have been largely brought into contribution, and yield the brilliant colours which characterise so much of the colour-printing of the present day.

The ink is applied to the forme by means of rollers, consisting of a metal stock or spindle thickly coated with a composition of glue, treacle, and Paris white, or of glue, glycerine, and sugar. The composition will probably be supplied to the printer ready made, but making and remaking of rollers will generally be carried on to some extent in the mechanics' shop or boiler-house. The method of melting the composition in order to cast the rollers in metal moulds should be examined by the surveyor. The material is sometimes melted in a large kettle over an open fire, but the use of a steam-heated pan for melting purposes is of course the preferable method.

The washing of rollers and formes is a matter calling for notice. Formerly alkaline lyes were chiefly used for washing the type, but in the present day both formes and rollers are largely cleaned by means of turpentine, petroleum, benzoline, &c. Very special attention should therefore be directed to the nature of the detergent used in each risk, and it is imperative that rags or waste impregnated with spirit or with lubricating oil be kept in covered metal boxes and be removed from the premises when work ceases for the day. It will also be desirable that only the smallest possible quantity of spirit be permitted to be kept in the main buildings.

It was formerly the practice to damp the reams of paper in troughs of water before printing, and there was no little danger of spontaneous combustion arising from solid blocks of paper being stacked in a damp condition, but now, in the case of general printing, the practice of damping the paper is not so often met with. In newspaper work, however, when the paper is supplied to rotary machines in reels, it is as a rule first passed between damping rollers forming part of the machine.

In offices where rotary web-printing machines are used the printing cannot be effected from the flat and type forme as in machines of other patterns, consequently a cast of the matter on thin sheets of metal has to be taken, and these are bent round the cylinder. Again, even in the case of flat-bed machines it is often necessary to use the type for other purposes before the actual printing is completed. The operations of Stereotyping and Electrotyping enable the printer to release his movable

type whenever he desires to do so. Both operations are, from the Insurance office point of view, comparatively harmless processes, and only call for a brief description.

Stereotyping was originally suggested as far back as 1752 by William Ged, an Edinburgh goldsmith, but his ideas were scouted, and it was not until 1856 that the *Times* newspaper again led the way. A mould of the type forme is taken by means of alternate sheets of damp blotting paper and tissue paper pasted together, being beaten by a hard flat brush into the face of the type. The "flog," as it is termed, and the type are next subjected to pressure in a kind of copying-press heated by a gas burner, the mould being then stripped off from the type and allowed to dry. When sufficiently dry it is placed in the casting-box, a metal apparatus also of the copying-press order, and also gas heated, into which molten type metal is poured. It takes but a few seconds for the metal to set, and when the stereotype plate thus obtained is withdrawn it only requires to be trimmed and mounted on a wooden block, when it is ready for the printing press. Gas stoves will probably be found on the trimming and finishing bench, and these fittings should be carefully examined. Flexible rubber tubing is, of course, to be deprecated.

Electrotyping is an electro-chemical process by means of which, through the deposit of copper upon a mould, a facsimile of the original type or drawing is produced. The mould is obtained by taking an impression from the original in wax. This mould is next coated with black-lead and placed in a bath containing copper sulphate—the blue vitriol of commerce—in which a plate of copper is also suspended. An electric current from a dynamo is then passed into the bath (the suspended copperplates being the positive and the plumbago-coated mould being the negative electrode), with the result that the solution of copper sulphate is decomposed, the copper therefrom being liberated and deposited on the mould. Simultaneously the suspended copperplate is being acted upon by the sulphuric acid, formed through the decomposition of the solution so as to yield a continuous supply of copper sulphate, and this process goes on until the mould has been sufficiently coated with copper. When this stage is reached the wax is melted out, leaving a thin skin of copper, representing the original type or drawing; this is backed up with a thin layer of type-metal, and is mounted ready for printing.

The forme, when it leaves the caseroom, is ready for actual printing, which may be performed on a hand-press or on a power printing machine. The former, however, except for taking proofs and for special work, or where only a few impressions are required, is practically obsolete. The press used by old-time printers was a cumbersome erection, and it did not give place to the iron press until the beginning of the nineteenth century, when the third Earl of Stanhope invented the machine bearing his name, in which the essential principle was much the same as in the more modern press (Fig. 8).

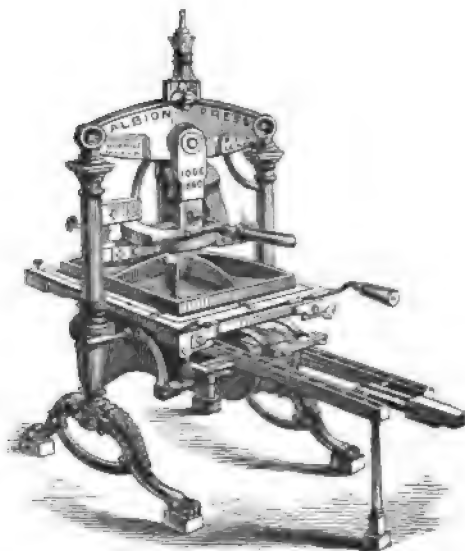


Fig. 8. — HAND-PRESS.

The forme of type is laid on its bed or "coffin" on the "carriage" of the machine, and ink applied thereto by means of a roller; the sheet of paper to be printed is placed on the "tympan," a leaf hinged so as to fall over the frame; the frisket, a skeleton frame, like a window frame without glass, is folded on the top of the tympan, and the tympan laid over the type. The carriage is run under the "platen," which descends and thus applies the pressure necessary to produce the impression. The carriage is then withdrawn, the frisket and tympan opened, and the printed sheet removed. It is obvious that each of these several operations,

however quickly performed, occupies an appreciable space of time in its performance, so that as a matter of fact the two pressmen engaged at each press can accomplish only from 400 to 600 single impressions per day.

In the case of a sheet requiring to be printed on both sides, it may sometimes be necessary to proceed with the second printing before the first impression has sufficiently dried. Under these circumstances some portion of the ink from the side already printed is apt to be left on the parchment of the tympan, and "sets off" on the succeeding sheet when placed in the press. It has been found that a thin sheet of paper, washed over with turpentine or saturated with benzine or oil, when pasted on the tympan prevents the "set off." The "set off" papers require to be changed from time to time, and if they are simply crumpled up and thrown down amongst other waste an outbreak of fire may be confidently expected. An Insurance journal has recently called attention to this element of hazard, and properly suggests that a covered metal box, removed daily, is the proper receptacle for such dangerous refuse.

When the meagre output of the hand-press is contrasted with the capacity of a present-day quadruple web newspaper machine, a striking example is afforded of the remarkable development which has taken place in printing machinery since the first steam printing press was introduced by the *Times* in 1814. At the present day a large variety of machines are in use, but for our purpose we may refer to them under four classifications, i.e., platen machines, single cylinder machines, double cylinder machines, rotary machines.

Platen machines (Figs. 9 and 10). These machines are intended for printing small sheets, say from the size of a post-card to that of a sheet of foolscap. The main feature of machines of this class consists in the fact that the forme instead of being placed on a horizontal bed occupies a more or less vertical position. Two or three inking rollers, receiving their supply of ink from a duct-fed disc revolving on the upper part of the machine, travel down the face of the type and run back to the disc. The sheet of paper is laid on the platen, which closes up against the type and falls back again to permit of the printed sheet being withdrawn. The whole of these operations are so quickly performed that with some machines a speed of 1200 to 1500 sheets per hour is attainable.

Single Cylinder Machines (Fig. 11). Machines of this class differ radically from platen machines. The term "Wharfdale" is generally used to designate machines of this description, in all of which the essential principle is much alike.

A hollow metal cylinder revolves in fixed bearings about the middle of the machine, while immediately underneath there runs to and fro a carriage carrying the forme-bed and the ink table; the one at the far end and the other at the near end of the machine, with the cylinder between. The inking arrangements consist of a metal slab having at the outside end an ink duct, with which a series of feeding, distributing and inking rollers is connected. The upper face of the slab, through its contact with the feeding and distributing rollers, becomes smeared with the ink, and in its passage underneath the inking roller it coats the latter, and they in due course impart the ink to the forme when it in turn passes underneath them.

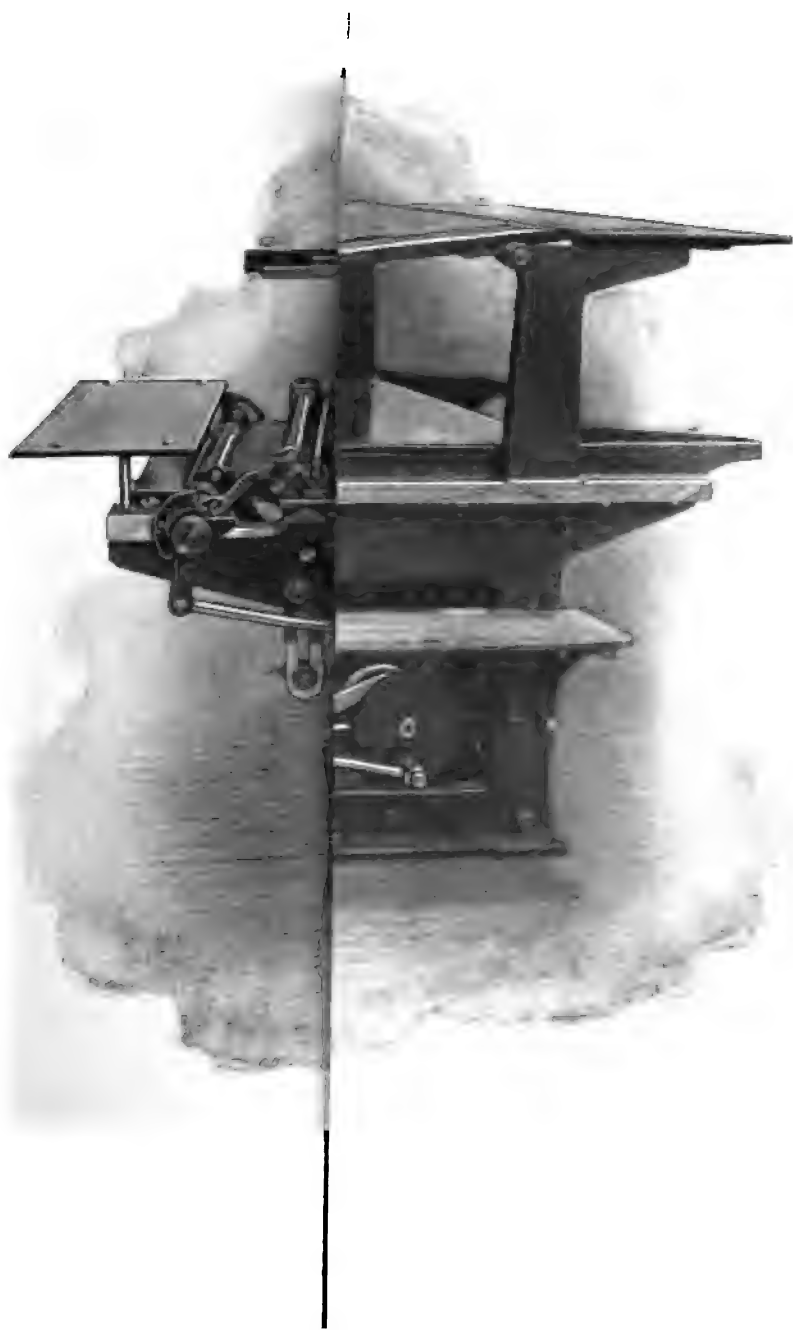
The sheets of papers are fed in singly by hand at the other end of the machine, and by means of grippers are carried underneath the cylinder, with the result that when the type forme, by the reciprocal motion of its bed, passes below the paper the underside of the paper receives the required impression. The operation of thus printing the paper on one side is completed by the sheet being thrown off the machine on to the delivery board by means of the "flyer" or taking-off apparatus, and if the paper is to be printed on both sides the operation is repeated on a subsequent occasion.

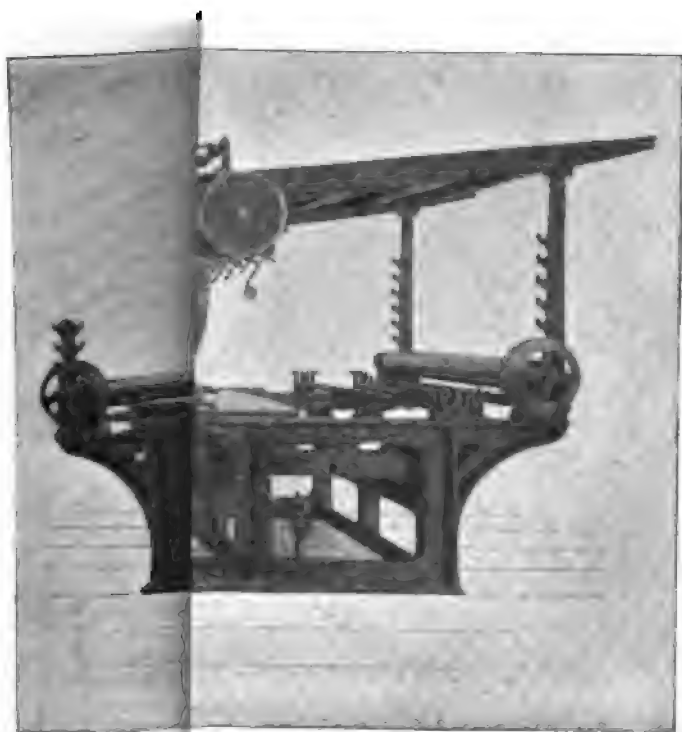
Double Cylinder or Perfecting Machines (Fig. 12) print single sheets on both sides during their passage through the machines. They have two impression cylinders with intermediate drums for turning or reversing the paper, and are fitted with two type beds and ink tables. In other respects the description of the single cylinder machine just given will suffice.

Rotary Web Printing Machines (Fig. 13). In the hand-press and the platen machine we saw that the impression surfaces are flat, and that in the cylinder machines the impression was effected by means of a revolving cylinder operating on a flat surface. In the rotary machine employed in newspaper printing entirely different principles are brought into play, as both sides of a continuous web of paper, perhaps two or three miles in length, are printed from a circular forme by means of cylinders. Thus the web of paper, the type-forme, the inking arrangement, ^{water} and



Fig. 10.—PLATEN MACHINE.





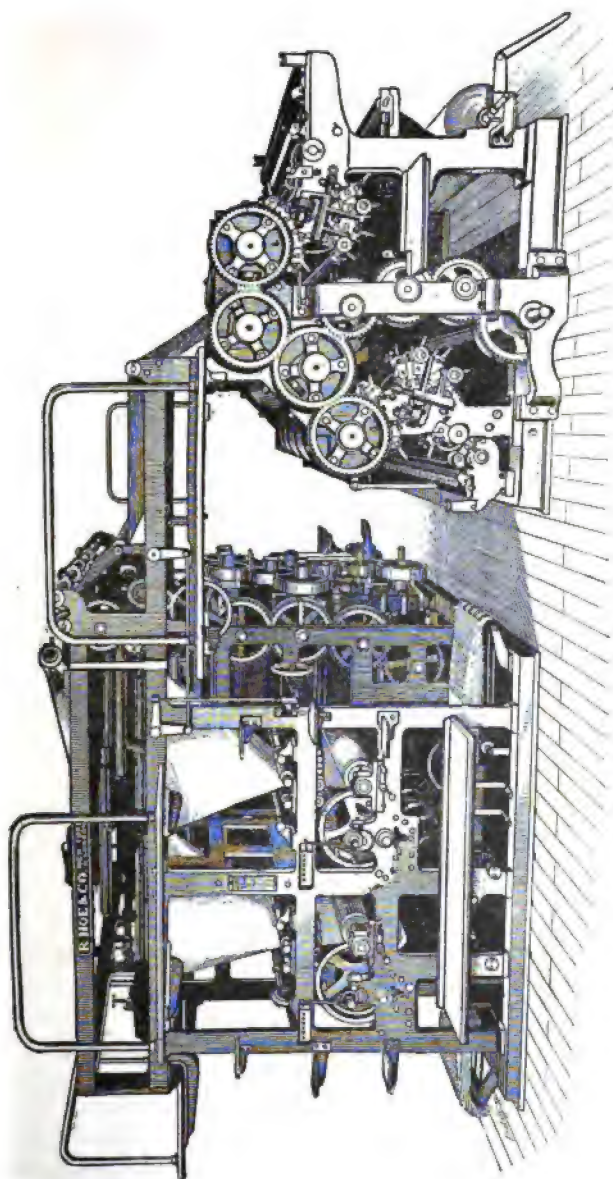
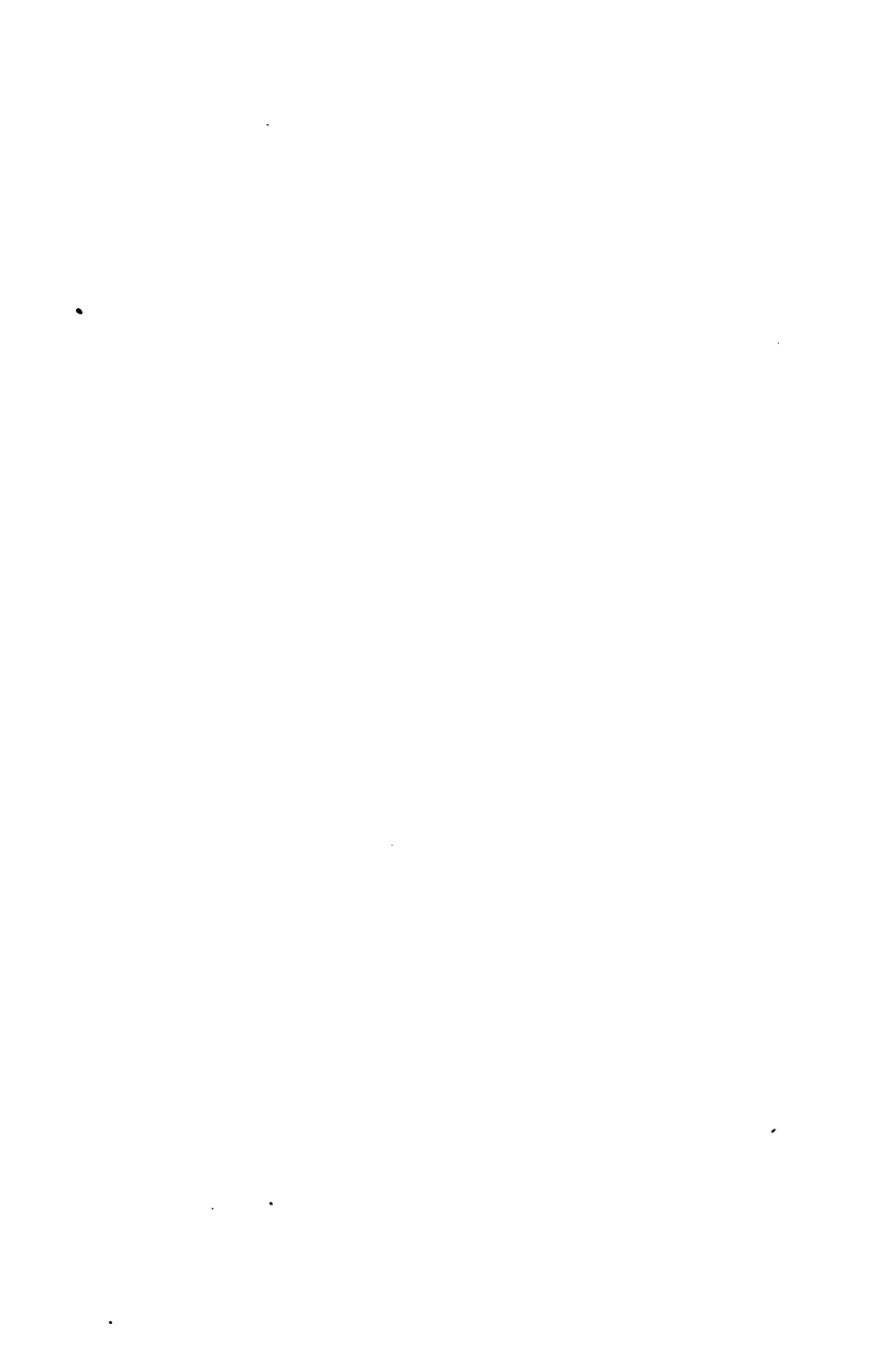


Fig. 13. — ROTARY WEB PRINTING MACHINE.



the impression surface are all circular in form. The mechanism of these machines is so complex, and there are so many varieties, that a description would be impossible within the limits of this paper. An idea of the complexity may be formed when it is stated that some machines take four webs of paper simultaneously, and not only print but also damp, cut, fold, paste, deliver, count, and sometimes wrap 48,000 newspapers per hour. Our illustration represents one of the Hoe Quadruple Machines used in the *Scotsman* Office.

In order to secure a solid foundation for the machines, the machine-room generally occupies the ground or basement floor of the building. The larger classes of printing machines are often constructed over open pits, and in considering the eligibility of a risk, regard will be had to the condition of these pits at the time of inspection, as they offer convenient facilities for the disposal of waste paper and dirty rags. The arrangement of gas fittings in relation to their proximity to the machines is also a matter deserving attention. Many risks, particularly in large cities, have outgrown their capacity, and consequently machine-rooms are so crowded that the danger from fire is thereby much increased.

In the better class of work, the printed sheets, when they leave the machines, are subjected to a drying process by artificial heat to avoid any smearing of the ink. The natural heat of the warehouse is sometimes sufficient for the purpose, but in some works a specially-heated room is reserved for the operation. The sheets may be suspended on lines or racks, or be placed on trays. The attention of the surveyor should, of course, be directed to the method employed in heating such rooms. Hot air, hot water, high or low pressure steam, or even pipe stoves may be used, and each has obviously its own particular danger. Roof lights in the room may even prove a source of trouble, and all gas lights should be surrounded by wire cages. Such drying-rooms should have no combustible material in their construction, and all communications should be protected by double fireproof doors.

In this connection I quote a paragraph from a recent issue of a technical journal:—

“Some recent fires in printing offices showed that too much care cannot be observed in order to prevent fires. Benzine and similar products have an unenviable reputation. Damp

"lamp-black will ignite from the sun's rays. Lamp-black and a little oil or water will, under certain conditions, ignite spontaneously. New printers' ink on paper when in contact with a hot steam pipe will ignite quickly."

In order to remove the indentation caused by the type, high-class work is generally pressed either by the hot or cold press method. The former method is carried out by placing a glazed board, chiefly made from rope, between each sheet and subjecting the pile to pressure either in a screw press or in a hydraulic press. The hot pressing used to be accomplished by placing heated iron plates at intervals between the sheets when placed in the press, but this method has given way to a hot rolling process, which consists in passing the sheets between steam or gas heated metal rollers.

Other machines may frequently be found in the warehouse, such as guillotines (Fig. 14), perforating machines, eyeletting and punching machines, and wire or thread stitching machines, but their presence calls for no special comment, except to remark that paper shavings should not be allowed to litter the floor, but should at once be removed to a place of safety.

Varnishing or gumming may also be carried on in this department, and as the sheets must be laid on open racks to dry, a very real danger of fire exists where such processes are performed.

In some printing offices the binding is done on **Bookbinding.** the premises, but there are, of course, a large number of firms whose sole business is bookbinding.

Until recent years the work was almost entirely carried out by manual labour, but now a large proportion is performed by machinery of the most ingenious character. Folding and stitching (Fig. 15), gumming, backing, and blocking power-machines are to be met with in the modern binding shop, and have brought with them the risks inherent to the use of machinery. The position of gas lighting or heating appliances is sometimes a source of danger. A swinging gas bracket may sometimes be seen in such close proximity to a ruling machine, of the usual wooden construction (Fig. 16), as to render immunity from disaster little less than miraculous.

The finishing tools are heated on gas stoves standing on wooden benches, and these should be carefully examined by the surveyor, who will also note the degree of cleanliness and order observed in the shop. Clippings of mill-board and paper shavings

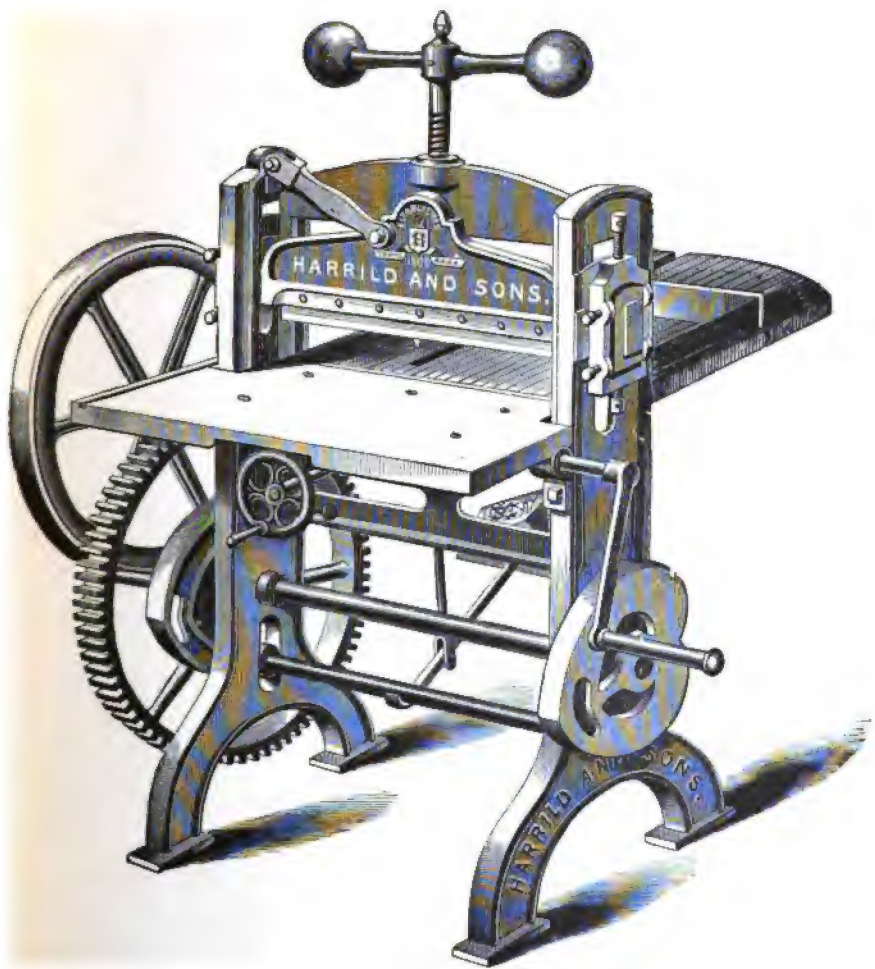
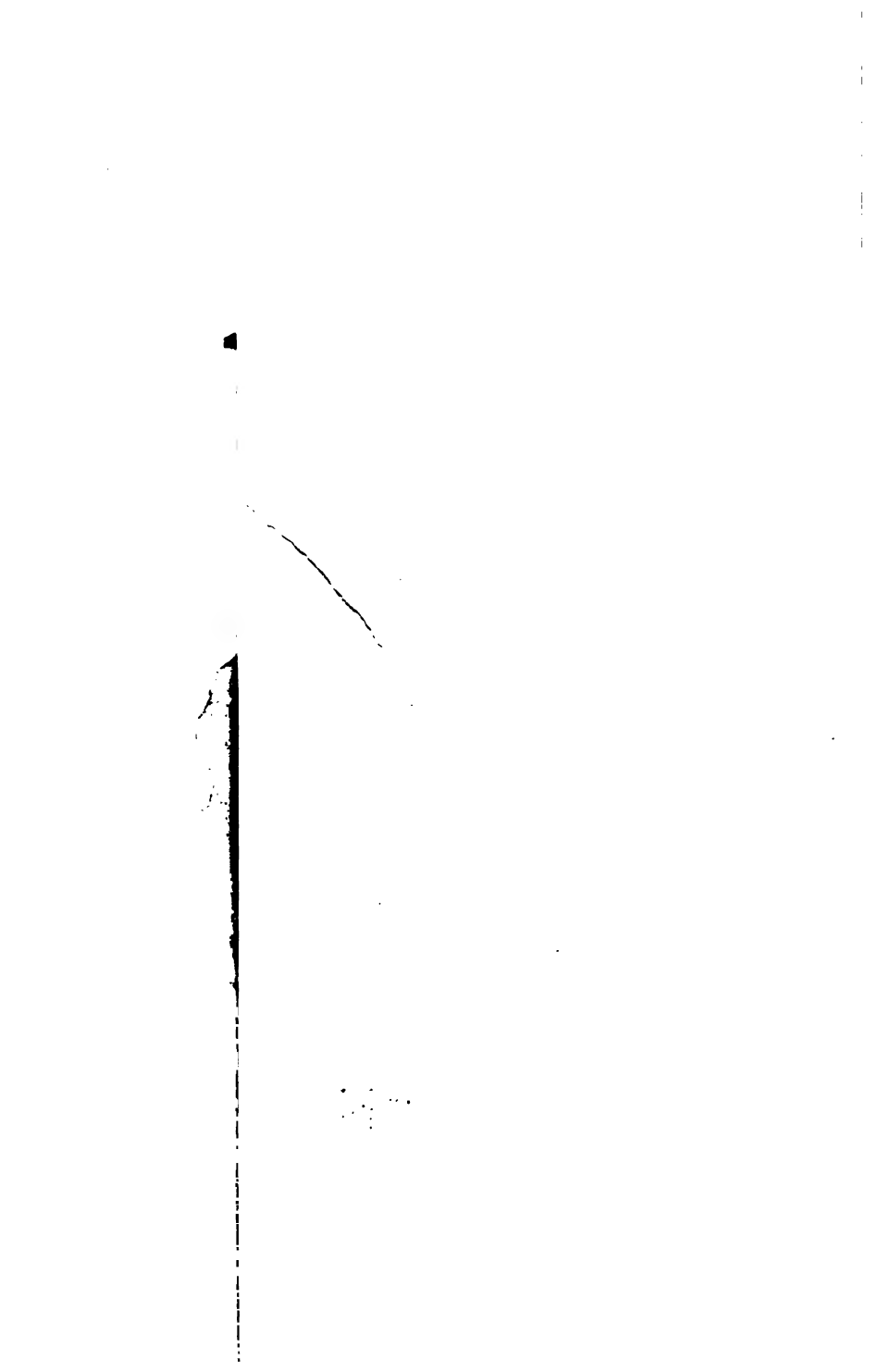


Fig. 14.—GUILLOTINE.





2000

from the guillotines should be at once collected and bagged, and the bags moved to a place of safety.

These risks have earned an unenviable notoriety from an Insurance point of view, owing largely to the great quantity of flimsy and inflammable material which litters premises where the work is performed by hand. Manual labour is, however, rapidly being superseded by machinery for cutting, folding, gumming, and counting the bags and envelopes. The necessity for laying out or hanging up the goods to dry, is thereby largely obviated, and there seems to be some hope that an improvement in risks of modern construction and equipment will be experienced.

Illustrations printed by letterpress are produced from woodcuts and electrotypes, process-blocks or half-tone blocks.

Wood-cutting is, as a rule, performed by draughtsmen in their own studios, but even if the work be carried on, the operation of cutting away the wood so as to leave the design in relief presents no element of material risk. The wood used is box-wood, previously prepared for the purpose, and the chips from the graving tools are of little account.

The preparation of process-blocks and half-tone blocks is a complicated photo-chemical process which, as a rule, is carried on by firms making them as their sole business.

A photograph of the drawing is transferred to a plate of zinc or copper, and by the application of chemicals, portions of the metal surface are eaten away, leaving the design in slight relief.

Except in the case of the new three-colour process, colour printing by letterpress is attained by a separate printing for each colour, and it follows that a separate forme is necessary for each colour employed. Great care has to be exercised so as to secure true "register," otherwise one colour would over-lap the other, and the result would be anything but pleasing.

The following description of three-colour printing may have recently come under the notice of members, but its reproduction may be useful :—

It is well known that all colours have their origin in the colours which form white light, alone or in combination. These latter colours are called primary, and consist of red, blue, and yellow. The process of obtaining a photograph of an object in its natural colours is gone

about in the following way. Three photographic plates, which are sensitised so as to transmit only two out of the three colours, are employed, and they make separate records of the three primary colours. The plate used for printing the red colour sensation is constructed to see yellow and blue combinations, and is insensitive to red or its combinations. In the same way the blue negative is sensitive only to red and yellow, and the yellow plate reflects red and blue only. This is effected by means of a transparent screen, which is placed before or behind the lens and admits two of the colours while excluding the third. Having obtained the three photographs which contain the colours of the subject, the next step is to convert them into half-tone blocks, and to reproduce from the printing surface on the paper the natural colours of the subject. This is done by printing the block representing the yellow colour in yellow ink, the red block in red ink, and the blue in a colour of the same hue. The red block is put accurately on the top of the yellow block, and then the blue is printed over both. The finished production shows all the natural colours of the subject which was taken as a study.

Within recent years the process of coloured photography has become an important factor in the printing press, and the two methods employed are known as the indirect and direct processes. By the former the mechanical screen is dispensed with, and transparencies have to be made of the negatives on glass. It is from transparencies that negatives with the indispensable grain are made and printed for etching on copper or zinc.

The other method, known as the direct process, utilises the half-tone screen, the result being a grained negative which is capable of being transmitted directly on to metal. In the printing process the same method is employed as in the photographic film, and when the impression has been registered with the three blocks, every shade of colour has been obtained for the picture.

Embossing by letterpress processes calls for some reference, owing chiefly to the fact that the etched plate is fastened to its metal mount by pitch or by guttapercha dissolved in benzine or turpentine, and the counterparts are sometimes made of sealing wax, indiarubber, or celluloid. As heat is required in the several operations, considerable risk of fire and explosion is incurred.

COPPERPLATE PRINTING.

Copperplate printing differs from letterpress printing in that, while in the latter the printing surface is in relief, in the former it is in intaglio. The line to be printed is hollowed out of the plate by a steel graving tool. This hollow becomes filled with the ink applied to the plate, that remaining on the surface.

being wiped off; a sheet of damped paper is placed on the plate and the impressing cylinder of the printing machine draws the ink from the hollow on the paper, producing the impression required.

If it is desired that the copperplate should be etched instead of engraved, the plate is thinly coated with a mixture of beeswax, asphaltum, and gum mastic; the artist with a needle draws the subject on this etching ground, thereby removing the wax and leaving the copper bare, with the consequence that when the plate—with its back and edges protected with Brunswick black—is placed in a bath of nitric acid, the exposed copper is eaten into by the acid. Such gradations of light and shade as the design may require are produced through the copper being bitten more deeply for the darker lines by repeated applications of the acid; those portions of the plate intended for the production of the lighter lines being preserved from the further action of the acid by a coating of Brunswick black.

The mezzotint and photogravure processes are variations and developments of these engraving and etching processes.

LITHOGRAPHY.

Unlike letterpress printing and copperplate printing, lithography is a process which enables the printer to produce an impression from a flat surface.

Invented in Germany in 1796, this method of printing is based upon the following facts:—

- (a) That resinous and greasy substances readily adhere to a certain kind of limestone.
- (b) The facility with which this limestone absorbs water.
- (c) The affinity of one greasy compound for another and their antipathy to water.

The most useful stones are quarried in Bavaria. They are cut to all sizes, while the usual thickness of a stone for printing is about three or four inches, and they are capable of taking on an extremely smooth surface. On this smooth surface the design is either drawn direct, or, more frequently, transferred from an original on transfer paper. In both cases the drawing is done in a specially prepared ink or chalk composed of soap, wax, lard, and shellac, with the addition of black as a pigment. This greasy compound, as we have seen, adheres firmly to the stone, but to prevent it spreading, and to neutralise the alkali in the soap, it is washed over with a solution of gum arabic and sulphuric acid in

water. This solution is afterwards partly washed off with clean water, and any superabundance of ink removed by the application of spirits of turpentine. The whole surface of the stone is then damped with a sponge, and the printing ink is applied by means of a leather-clad roller, when the ink adheres to the design, while the remainder of the stone remains quite clean. A sheet of paper is then placed on the stone and pressure applied in much the same way as in letterpress printing, except that in the case of the hand-press the pressure is obtained in a slightly different manner. A wooden scraper is fixed on the upper portion of the press, while the bed which carries the stone and paper is movable, and is, by means of a winch, moved backwards and forwards against the under edge of the scraper. Fig. 17 is a drawing of a power-driven litho-printing machine.

Pictorial work by lithography is produced by several alternative processes, such as chromo-lithography, collotype, and photo-lithography.

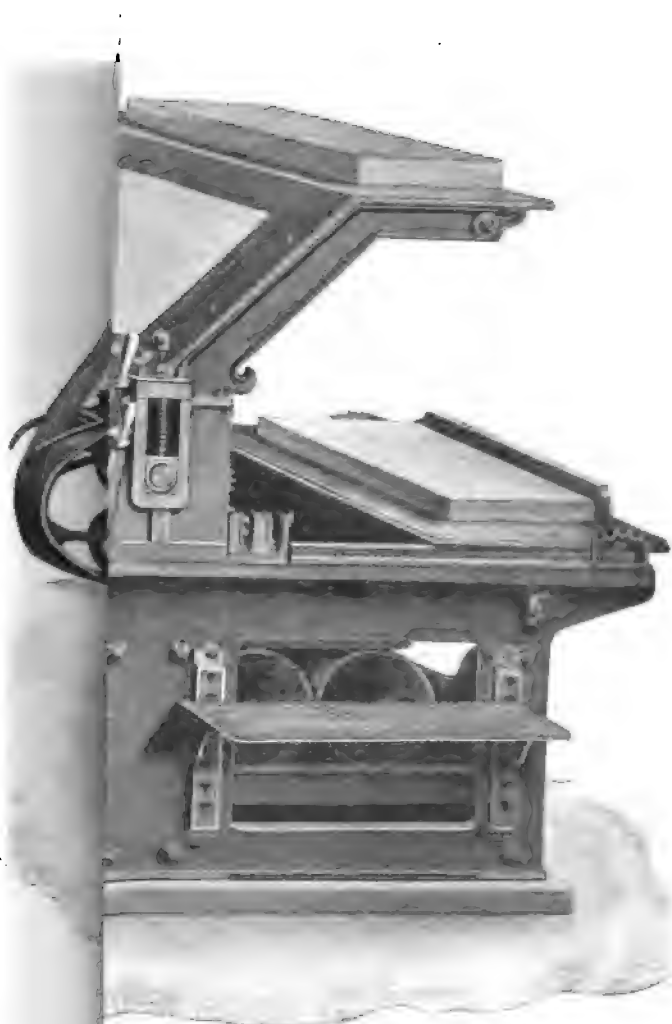
In *Chromo-Lithography* the original painting is covered with a sheet of transparent gelatine, on which the work is copied and in due course transferred to the stone. A separate stone being required for each colour, sometimes as many as twenty or thirty stones, and, of course, a corresponding number of printings being necessary. Since this paper was written, an interesting article on this subject has appeared in the January number of the *Strand Magazine* which is worthy of perusal.

Collotype work is printed not from a stone but from a glass plate carrying a gelatine film, upon which the subject has been produced by means of photography. This gelatine plate is so treated that its surface possesses like properties to the stone, so that printing is similarly accomplished.

In *Photo-Lithography* a print from an ordinary negative is obtained on special sensitive transfer paper and transferred to a stone, from which it is printed in the usual way.

During recent years zinc and aluminium plates are taking the place of stones, more especially as originals or "mother" stones.

Bronzing machines often form part of a lithographer's equipment, and are less objectionable from the Fire Insurance than from the Life Assurance point of view. The dust given off during the process has a very injurious effect on the health of the operatives, and



the Home Office has recently promulgated suggestions which will probably in time be followed by compulsory regulations.

Lithotype. An entirely new process bearing the name of Lithotype has during the last few weeks been introduced to the notice of the trade, which may in the future largely affect printing methods. The primary part of the process seems to be based on the paper-ribbon punching system of the Monotype setting-machine, but the ribbon, instead of being used for type-founding, is used to produce a transfer of the letters to aluminium plates, from which the printing is done by means of lithography.

POWER.

Steam, gas, and electricity are now all largely employed as the motive-power for printing machinery, but probably the last-named will ere long, for many reasons, become much more generally used.

The chief dangers of steam-power lie in the possible proximity to the boiler furnace of hidden wood-work, and in the drying of inflammable material over the boiler itself.

It is surprising how difficult it is to convince users of gas engines that any danger is to be apprehended from the exhaust-pipe. Quite recently one of our officials when inspecting a risk picked up an old sack that had been thrown down on an exhaust-pipe, partially embedded in a cement floor, and by so doing probably averted a serious loss—"cause unknown"—as the sack was actually smouldering at the time!

Printers themselves are becoming more alive to the dangers of a poor or overworked electrical installation, and a recent article on the subject in a trade journal contains timely warnings as well as sound advice.

The electrical installation rules of a well-known office contain special instructions for installations in printing and bookbinding works, which I take the liberty of reproducing.

The power in Printing and Bookbinding works being advantageously greatly sub-divided, *separate compartments* for the motors are not usually practicable, so that *enclosed* or thoroughly protected types of *motors* and resistances conforming to general rules are necessary. Neither these motors nor the resistances (especially the speed regulators) should be situated underneath the machines where waste paper is thrown.

ELECTRICAL HEATERS for glue and paste kettles should have wire *guards* around them to keep papers or books out of contact with them, in addition to the sheet-metal protection for the surface of the table. These heaters should stand on feet so as to be at least three inches

above the table. The connecting conductors for these heaters should be specially protected against injury where rising through the table, preferably by a short length of strong piping, let into the table and standing up at least one inch.

It is preferable that *cut-outs* be grouped upon proper slate distribution boards, but if odd china cut-outs be used, then they should not be placed where the covers are liable to be broken (as so often occurs in these risks).

RATING OF RISKS.

As most members are aware, special arrangements are in force for rating the larger printing risks, and over 700 risks in all parts of the United Kingdom (the aftermentioned special districts excepted) have been dealt with by the Offices.

Great advantage has thereby accrued both to the insured and to the Offices, and much valuable information has been obtained.

Printers' risks in the London district are similarly dealt with, and the more important risks in Glasgow are rateable under a special section of the Glasgow General Tariff, while Belfast risks are rateable under the Belfast General Tariff.

During recent years the introduction of high-speed machines and the displacement of much hand labour by machinery, particularly in type-setting, bookbinding, paper bag-making and envelope making, have effected considerable modifications in the character of individual risks, and when the time arrives for a revision of the methods of rating the altered conditions will demand careful consideration. For instance, the number of hands employed does not now, as in the past, afford a reliable indication of the extent of the establishment, but, on the other hand, the buildings are in many cases undoubtedly much cleaner and more tidy.

Improvements in building construction, too, may sooner or later render a revision of the incidence of rating desirable. So many works of one storey in height with incombustible floors and walls have been erected during recent years—particularly in Scotland—that it may be possible to form a special class for such risks.

The features ordinarily present in printing risks most likely to contribute to the loss ratio are, in my judgment—

- Combustible floors* on which power-driven machinery is placed.
- Height :* Each storey above one is an added danger.
- Floor openings :* Staircases should be of incombustible construction, and should be enclosed in brick walls.

<i>Machines :</i>	Graded charges for all power-driven machines, based on a low normal rate would be equitable.
<i>Lighting :</i>	Approved electric lighting might be encouraged.
<i>Heating :</i>	Low-pressure hot-water systems are to be preferred.
<i>Drying rooms :</i>	Should be effectually isolated.
<i>Night-work :</i>	Owing to the many emergencies which arise in the trade it would probably be impracticable to impose an extra for nightwork.
<i>Use of Petroleum, Mineral Oil, Printeen, Naphtha, Turpentine, and the like.</i>	Only small quantities should be permitted in the main buildings, and none should be allowed to remain therein after working hours.
<i>Oil Waste, &c.,</i>	should be kept in metal receptacles and should be removed daily.
<i>Hands :</i>	Those employed exclusively in attending on machines (if all machines were charged for) might be ignored.

Risks with special features, such as working on celluloid, envelope making, paper bag-making, and cardboard box-making, should carry adequate rates for these processes.

WORDING OF POLICIES.

A word of caution with reference to the wording of policies on printing works may not be out of place.

Loss settlements are sometimes rendered needlessly complicated by reason of ambiguity in the wording of the contract, arising sometimes not so much from ignorance of the particular trade as from carelessness or lack of thought.

A specification recently came under my notice which for comprehensiveness combined with explicitness might well be taken as the model for a standard wording in Printers' Insurances.

It is as follows:—

ON THE BUILDING, and landlord's fixtures attached and belonging thereto, including steam, gas, and water pipes, but not including shafting, gearing, engines or their foundations, boilers, or economisers, or the apparatus belonging to them or any of them, or feed pump.

ON (1) MACHINERY, electric installations, including dynamos and motors, shafting, belting, gearing, engines and the foundations thereof, and the apparatus, accessories and connections belonging to and used for and with all or any of the foregoing ; (2) Trade and office furniture, including printed books and unused stationery in use by the Insured, and prints and paintings ; (3) Fixtures, other than landlord's fixtures, attached and belonging to the building ; fittings and all fixed and moveable trade and office utensils, and tools ; (4) Type ; type in forme ; line, half-tone, electro, zinco, stereo, wood and other blocks, moulds, matrices ; engraved plates ; lithographic stones, aluminium plates ; steel dies, steel punching dies, and work on all or any of these ; and (5) all other contents other than the stock-in-trade after insured, and other than steam boilers, economisers, and feed pumps—the whole the property of the Insured, or held by them in trust, for which they are responsible.

ON STOCK-IN-TRADE, manufactured, unmanufactured, and in process of manufacture, designs, drawings, samples, sample books ; all materials and ingredients used in or in connection with the manufacture and sale of the stock-in-trade, and all boxes, cards, crates, cases, bags, wrappers, labels, and all articles necessary for packing and carriage, or used in the manufacture of such articles—the whole the property of the Insured, or held by them in trust or on commission, for which they are responsible.

ON BOILERS and apparatus belonging thereto, and on the Economiser and Feed Pump.

ON CHIMNEY STALK.

This Policy does not extend to cover any loss or damage to Dynamos, Conductors, or other Electrical Apparatus caused by Electrical Currents or production of Electricity, the liability hereunder being limited to loss or damage arising from fire only.

Warranted that the Dynamo Machines, Wires and other Apparatus for producing Electric Lighting are arranged in conformity with the Rules of this Company for the Installation of Electric Light or Power in buildings.

In case of loss, no one Stone, Forme, Matrix, Block, Plate, or Die, with the work thereon, to be deemed of greater value than £10, and no one Design, Drawing, Print, Sample, Sample Book, or Painting of greater value than £20.

FIRES IN PRINTING WORKS.

In an old work on printing I lighted on the following lines:—

“ Fire is the scythe wherewith Time doth mow
Ten thousand precious volumes at a blow ;
Blest printing, best of all his rage withstands
And often chains his feet and ties his hands.”

The truth contained in this metaphorical effusion had no doubt some force when it inspired the author, but the present-day Fire

Insurance-man will incline to the opinion that modern printing adds fuel to fire.

I had hoped to support this opinion by statistics, but reliable and complete figures are difficult to obtain, and I was thrown back on the bulletin of fires published in a weekly Insurance journal. An examination of these bulletins for the last six years shows a record of 47 fires of a serious character, causing losses to the extent of £360,000. The estimated damage is no doubt often over-estimated; but if we allow for the under-estimated cases and the vast number not recorded, the fire waste during the period is probably not by any means understated.

Reference has already been made to a few of the many causes contributing to this serious waste. In everyone of the 47 losses just mentioned, the cause is stated as "unknown," but through the kindness of friends I have been more fortunate in obtaining somewhat reliable data regarding this important branch of the subject. Through the good offices of these friends it has been possible, from Municipal Records, Salvage Corps Returns, the experience of one Company and the information possessed by one or two Loss Assessors, to compile a statement showing the various causes assigned for a fairly large number of fires in all parts of the United Kingdom.

The result of the investigation is as follows:—

FIRES CAUSED BY

Faulty construction of chimneys, fireplaces, hearths, furnaces, and boiler-houses,	88
Live coals, hot ashes, sparks from fires, and the drying of materials near fires or boiler-furnaces,	46
Gas, gas-lights and gas engines,	47
Lamps, candles, and spirit-vapour coming in contact with naked lights,	24
Lights and matches thrown down,	62
Spontaneous ignition,	24
Various causes,	38
Suspicious or malicious origin,	7
Fires in adjacent premises,	47
Unknown,	225
Total,	608
Cause not stated,	19
Total number of fires investigated,	627

The large proportion of unknown causes is an unsatisfactory feature in this analysis, and it would be rash to draw any inference therefrom, but it may be conjectured that spontaneous ignition is responsible for not a few of the unexplained outbreaks.

In concluding, I should like to refer to the construction and arrangements of printing premises. Possibly in the printing trade more than in any other, buildings erected for a different purpose, and often ill-suited, have been adapted for printing offices. Is it too much to suggest that this use of unsuitable buildings has contributed largely to the inflation of the loss ratio, and is the opinion not justified that the comparative immunity from serious fires in printing risks which Edinburgh has experienced during the last thirty years or more, is largely due to the fact that the more important establishments are housed in buildings specially designed for the purpose?

A marked tendency of recent years is the removal of Printing works from the crowded districts of large cities to the outskirts and to country towns. Provided efficient brigades and adequate extinguishing appliances are readily available, this change is to be welcomed by the Fire Offices, as the lower value of land enables firms to acquire ample space for present requirements and future extension, free from the risk of exposure to other buildings.

On such sites it is possible to erect one-storey buildings of the type we are now familiar with in our city. The multiplication of such shed-buildings, largely constructed of fire-resisting materials, would undoubtedly be followed by a marked diminution of the fire waste; and if the various departments were effectually separated from each other by fireproof compartments, the serious fires we are so painfully accustomed to would be of rare occurrence. This is doubtless a counsel of perfection, but it is, at anyrate, an ideal to be aimed at. The city storied-building will, however, always be with us, to some extent, but fireproof floors, fire alarms and sprinkler installations would bring about a vast improvement, greatly to the advantage of both the printing trade and the Fire Offices.

For the loan of the blocks used in illustrating this paper I have to thank the following machinery makers, who willingly responded to applications for their assistance:—

Messrs. Harrild & Sons, Farringdon Street, London—
Figs. 1, 2, 3, 8, 9, 10, 11, 14, 15, 16, and 17.

Linotype & Machinery Limited, London—Figs. 4 and 5.

Lanston-Monotype Corporation, Limited, London—Figs. 6
and 7.

Messrs. Thomas Middleton & Co., Limited, London—
Fig. 12.

Messrs. R. Hoe & Co., London—Fig. 13.

CANADA :

SOME OF ITS FIRE INSURANCE PROBLEMS.

By C. R. G. JOHNSON.

*A Paper read before the Insurance Institute of Montreal,
January 21, 1904.*

It is said that the late Mr. Gladstone, after reading a book by Mr. Andrew Carnegie, remarked—"I admire the courage of a man who, not knowing how to write, writes upon a subject of which he knows nothing."

When, less than two weeks ago, I was honoured by being asked to prepare and read a paper upon a topic which, as you will see by your Syllabus, was to have been dealt with by a gentleman far abler for the task than I am, or could possibly be, and when in a moment of haste I consented, the foregoing anecdote, with all its cynicism and satire, leaped into my recollection; and since then it has been hissed into my ear by all the demons that haunt the waking hours of night. To cheer me up, a kind friend, to whom I had written for some statistical information, and who could not furnish it, replied—"Why didn't you get out of the job by saying you knew nothing of the subject? For you *don't*, you know."

But I felt I *did* know a little about my subject, that I had known a little more and forgotten it, that it would be possible to refresh my memory, and that some of my friends whose experience in fire underwriting has extended over a wider field than mine might afford me information if I asked for it. And so here I am—a stop-gap, it is true, but willing to do my best, after begging your indulgence and that of any in the audience who might, failing this apology, incline towards Gladstonian criticism, or criticism of that blunter kind with which my friend referred to favoured me. Let me add that the title of this paper will not correspond exactly with your Syllabus, but will read—"Canada: *Some of Its*

Insurance Problems." I think you will agree with me that the alteration is along the line of brevity and in the direction of modesty—and modesty, at least, under the circumstances, is called for.

It is not necessary to discuss the several meanings of the word "problem." In general use it is taken to signify any question involving doubt, uncertainty or difficulty, and requiring effort or experiment for its solution. That this definition is applicable, in all its qualifications, to Fire Insurance in general and to Fire Insurance in Canada in particular, it requires but little consideration to admit, for doubts, uncertainties, *and* difficulties hedge us in on all sides, and continuous and patient effort has been the main feature in the history of Fire Insurance in this Dominion.

It is not within the scope of this paper to deal with the general problems which confront Fire Insurance Companies here and the world over, although one might easily be led into paths so tempting and so alluring. Generically such problems are the same; specifically they differ widely. It is the problem of Fire Insurance in our own country we are to consider, and I shall endeavour to confine myself thereto as closely as possible. But please bear in mind that Fire Insurance problems, which are general in a sense, are apt to become specific when they rise or exist in a particular field. Upon them, as upon animals and plants, environment forces certain features, certain characteristics, which render them peculiar in a measure to such a field or such a territory, and under such conditions they deserve consideration. With this explanation as to the course my remarks will follow, and remembering that, subject to the approval of your Governing Council, this paper will be laid before the Federation of Insurance Institutes of Great Britain and Ireland, whose members can hardly be as familiar with our country as we ourselves are, let me refer to

The Dominion of Canada, which, including the Canada, and Yukon District, covers an area of about 3,745,000 what it is. square miles (nearly as much as all Europe), extends from 45 degrees north latitude to Hudson Bay, and from the Atlantic to the Pacific Ocean. Its physical characteristics vary from undulating prairie lands to towering mountains, from great inland seas and large rivers to thousands of smaller lakes and streams. Wide forests, as yet untouched, await the axe of the lumberman, or, perhaps, the spark of fire which so often

precedes him; tremendous water-powers remain to be developed. It is a country of great distances, vast natural resources, and a magnificent future; and yet it is one of the most thinly populated countries in the world!

Of population and of climatic conditions I shall presently speak more fully, but of the Canadian climate as a whole, I may now say that while its variations as between different parts of the country are less than in many countries of smaller extent, throughout its whole area Canada is characterised by greater heat in summer and a much lower temperature in winter than in corresponding European latitudes.

Canada is divided into seven Provinces, the North-West Territories and the Yukon District. It is governed by a Federal Parliament at Ottawa, the capital. The Provinces, the Territories, and the Yukon District have each a local Government dealing with its own affairs. It is not necessary for the purposes of this paper to describe the differences of form or constitution between these various Governments. It is enough to say that in the seven Provinces they are mainly modelled after the form of the Dominion Government, while in the Territories and the Yukon they are more elementary.

Having thus roughly described our field in a Canada from general way, let us view it from a Fire Insurance a Fire Insur- standpoint.

ance Stand- Canada may be truly called a woody country ;
point. her immense forests render wood the cheapest building material, and, except in the older and larger cities, wood is the material chiefly so used. Even in the older and larger cities there remain many wooden or frame ranges of buildings, relics of the time when the forests stood nearer by, and building regulations, if any, were lenient. Next to wooden buildings in a point of hazard come brick-encased or brick-veneered structures, that is frame buildings encased with a single layer of brick. I am unable to say to what extent this class of construction prevails in other Provinces, but in the Province of Quebec, and particularly in the city of Montreal and its suburbs, it is very common indeed.

Time forbids that I should enter into further details as to the construction of the many cities and towns in Canada, of which there are some 62 having a population of 5000 and upwards. Time again, and also lack of data, prevents my dealing with the

systems of fire protection in the various cities and towns, nor does the subject of this paper demand particular consideration for either of these matters. We have our real problems to consider, and must hasten on. But I have yet something to say of Canada in a descriptive way.

It would be a serious omission to attempt to describe the field without referring to the bush-fire hazard. As summer nears its end and the sun has dried up everything exposed to its rays, it needs but a spark in the grass to start a fire which may end one knows not when—perhaps not until heavy rains extinguish it. Numerous towns and villages throughout the Dominion are exposed to this danger, and many of them have suffered severely.

The United States as a Fire Insurance field resembling Canada in many respects, it is difficult to point out any class or classes of risk peculiar to our own country. However, I may mention as among those commonly existing Pulp Mills, Saw Mills, Planing Mills and other Wood-working risks, Fish, Fruit, and Vegetable Canneries, Mining risks, Iron Smelting and Iron-working risks, Grain Elevators, Cheese and Butter Factories, and Cold Storage Warehouses. I am not called upon to describe the hazards peculiar to each of the classes named, which are more or less familiar to all of us; but I may point out the importance of some of these industries as an indication of the premium income derivable from them. The capacity of the *public* grain elevators alone exceeds 25,000,000 bushels. There are more than one hundred *private* elevators, the capacity of which range from 10,000 to 600,000 bushels each. The sum of insurance annually placed upon lumber has been estimated at from 25,000,000 dols. to 40,000,000 dols. Official statistics relating to our exports of butter and cheese show an enormous growth in these industries. In 1892 the quantity of butter exported was 5,736,000 lbs., its value 1,056,000 dols.; in 1902 the quantity exported was 27,855,000 lbs., and its value 5,660,000 dols.; in 1892 the quantity of cheese exported was 118,270,000 lbs., its value 11,652,000 dols.; in 1902 the quantity exported was 200,946,000 lbs., and the value 19,686,000 dols. Following the productions of butter and cheese there has had to be an increase in cold storage accommodation. This has taken place chiefly at Montreal, where these store-houses cover a large area, constitute a serious conflagration hazard, and of course involve their own peculiar hazards, which I do not need to enlarge upon. I may add that Montreal is now the chief

cheese centre and shipping point in the world. The salmon canneries of British Columbia form another important industry, and contribute considerably to our premium income. The total number of cans filled, or the "pack," as it is called, varies greatly from year to year, according to the "run" of salmon. The number of cans was in 1900, 585,400; in 1901, 1,247,000; in 1902, 625,900. This rough description of some of Canada's industries, as relating to the sources of our business, would be incomplete without reference to the production of wood-pulp. Dr. George Johnson, the Dominion Statistician, in his booklet on "The Wood-Pulp of Canada," estimates that there are 4,500,000,000 tons of wood-pulp in sight in Canada. This of course means that there is sufficient wood to produce that quantity of pulp, and it is pointed out by "Industrial Canada," the official publication of the Canadian Manufacturers' Association, that at the present rate of consumption in Great Britain and the United States it would take 5000 years to exhaust Canada's supply. Dr. Johnson, in his Statistical Year-book of Canada for 1902, states that there were then thirty-five mills in operation, with an output valued at 4,383,000 dols. I would refer anyone wishing to further pursue this interesting subject to an excellent paper by Mr. Fred. W. Evans, read before this Institute on 26th February, 1903.

A short statement of the way in which the "Board" or Tariff Companies conduct their business in Canada will complete my description of the field. There are thirty-three of these Companies, and the great bulk of the business is done by them. Speaking generally, their Canadian Head Offices are situated at Montreal or Toronto. The different Tariff Associations of which, mainly, all of them are members, are as follows:

IN ONTARIO AND QUEBEC.

The Canadian Fire Underwriters' Association.
The Toronto Board of Fire Underwriters.
The Hamilton Board of Fire Underwriters.

IN NOVA SCOTIA.

The Nova Scotia Board of Fire Underwriters.

IN NEW BRUNSWICK.

The New Brunswick Board of Fire Underwriters.

IN PRINCE EDWARD ISLAND.

The Prince Edward Island Board of Fire Underwriters.

IN MANITOBA AND NORTH-WEST TERRITORIES.

The Manitoba and North-West Board of Fire Underwriters.

IN BRITISH COLUMBIA.

The Mainland Board of Fire Underwriters, at Vancouver.

The Vancouver Island Board of Fire Underwriters, at Victoria.

Again, speaking generally, I may describe these Boards as being composed, in the case of the Canadian Fire Underwriters' Association, of Managers, and in the other cases of Agents. Each Board makes rates within its own territory, and carries on the inspection necessary for that and other purposes. The Companies themselves also employ their own Inspectors. The different Boards have done a great deal of specific rating of cities and towns, but there is of course much more to be done. The great distances to be travelled, and the inadequate railway service in the newer Provinces, and indeed in the older ones also, renders the work of inspection, rating, and loss-adjustment very difficult and expensive.

We now come to the consideration of some of the problems which we, as fire underwriters, and as guardians of the capital invested in our Companies, have to encounter and deal with in our daily business lives. Those which I will attempt to describe are—

- 1st. Climate.
- 2nd. Competition.
- 3rd. Electricity.
- 4th. Government Supervision, Legislation, and Taxation.
- 5th. Conflagration Hazard.

If these could be classified in their order of importance I have little doubt you will agree with me that the one last-named should head the list. There is another problem, the final one, which involves and includes all the rest. That is the problem of profit-making. Strictly speaking the subject of this paper does not call for suggestions as to how problems are to be overcome, but merely for a statement or description of them, and though I may be tempted in some cases to depart somewhat from my literal

obligation, I fear I could not, even though I would, offer any valuable advice as to how *profits* can be made in this uncertain and disappointing Canadian field. For more than a third of a century this particular problem has engaged the attention of competent underwriters, and yet, though now and then some modicum of success encourages us, no permanent solution has been reached. I may, however, before closing, draw your attention to the relative courses of profit and loss in Canada over a period of 33 years. Let us now consider the question of

I have already referred to the intense heat, which
Climate. towards the close of our summer dries up grass, fallen leaves, and underbush, and thus prepares the way for bush-fires. I have also alluded to the general range of temperature in Canada. But what about the intense cold, which throughout nearly the whole of the Dominion comes upon us in "snaps," during the winter months—only at intervals it is true, and lasting generally not more than three days at a time—but, while with us, much to be dreaded by fire underwriters? The atmosphere throughout Canada generally is notably dry, but in winter it is, to use a champagne term, "extra dry." (I trust no one in the audience is making any mental comparison between this paper and our Canadian air.) This dry air, then, heated *inside* our buildings to a temperature of from 60 to 75 degrees, while the *outside* temperature may be anything from 20 degrees above to 20 below zero, must necessarily make such buildings and their contents more sensitive to ignition and more combustible. For firemen to cope with a fire when the mercury stands at zero, or thereabouts, is indeed a terrible task. To use the term, "cold snap," has a serious import, and brings with it visions of frozen hose, frozen hydrants, charred and ruined buildings covered with masses of ice, and firemen with clothes first wet, then frozen almost to the skin. I think you will agree with me that climate is truly one of our problems.

"Competition," it has been said, "is the life of **Competition.** trade." It is only true to add that it is often the death of competitors.

In Canada we have three varieties of competition in our business.

1. That between Tariff and Non-Tariff Companies, all legally operating in the Field.
2. That between the various Tariff Companies themselves.

3. That between Companies legally operating in Canada, and Companies from the United States, *not* licensed by our Government Insurance Department, *not* paying any taxes in Canada, but *illegally* transacting business therein.

Of the first kind of competition a good deal might be said, but I want to spare you figures as much as possible. I have been unable to procure much information as to the purely local (Mutual or Stock) Non-Tariff Companies in other Provinces than Ontario and Quebec, but it is really in those two Provinces where most of those Companies are. The Report of the Inspector of Insurance Companies for the Province of Quebec, for 1902, gives the returns of 10 Mutual Companies doing business in the Province. I quote round figures to indicate the volume of their combined transactions.—

Cash premiums	372,000	dols.
Number of Policies in force, 53,984		
Amount insured	51,900,000	dols.

A local Non-Tariff Stock Company was started in Montreal a year or so ago, and appears to be doing a fair amount of business.

In 1902 74 purely Mutual Companies reported to the Ontario Inspector of Insurance. Their combined net premium income was about 326,000 dols.

For the same year 11 Cash Mutual Fire Insurance Companies reported to the Ontario Inspector, showing their total net premium income as about 730,000 dols.

There are, in addition to the foregoing, 3 Joint Stock Non-Tariff Companies reporting to the Ontario Inspector and transacting business only in that Province. Their net premium income was, in 1902, nearly 100,000 dols.

There also are 5 Non-Tariff Stock Companies of considerable importance licensed to do business throughout Canada, and operating to a greater or less extent throughout the field, though one of them I believe is to some extent a Tariff Company. Their joint net premium income for 1902 was approximately 1,060,000, dols. though some of this no doubt is derived from surplus United States business.

The competition of local Mutuals though somewhat felt, is not regarded by the Tariff Companies as serious; to a large extent

they underwrite Farm business, which in parts of Canada the Tariff Companies as a rule do not seek.

The competition of the Non-Tariff Stock Companies, however, is very considerable, and to the Board Companies at times annoying. It is felt by the latter that the former do not always regard the matter of profit to be so important as that of getting business on their books. It is only necessary to look at the long list of Companies formed in Canada and failed since 1869, to become impressed with the danger of rate cutting, or indeed of departing in any way from the beaten paths of experience.

Competition between the Tariff Companies themselves proceeds merrily, and with comparatively little friction. Rate cutting is extremely rare. Of commission dividing we frequently hear, and offenders in this respect are occasionally (I wish I could say often, or always) brought to book. Virtuous avowals at Board meetings are not always followed by similar action, but, taken altogether, our various Boards work admirably and for the best interests of our business, and if they were dissolved chaos would reign supreme.

The illegal competition of unlicensed Companies from the United States is very irksome. Most of these Companies are known as the New England Mutuals, though five of them hail from other States. They are associated in two classes, the "Seniors," of which there are 16, and the "Juniors," of which there are 17. Each of these classes has what is called a Conference, meeting monthly, that passes upon risks from survey reports, fixes lines, and lays out plans for improved protection. Some of these Companies are by no means strong financially. The Seniors, the stronger ones, do not compete for Canadian business, unless for textile mill risks. The Juniors *do*, however, and their standard being lower than that of the Seniors, write exposed risks in cities and towns. It is only fair to say of these Companies that their system of inspection is most complete, and as their demands in regard to fire protection are most rigorous, they have attained great success in their own particular line, which is really more that of fire prevention than fire insurance. Their policies not being backed by capital, they have no stock dividends to pay. They pay no taxes in Canada, where they solicit business openly through so-called Inspectors. This is against the law, but the law is not enforced, and the licensed Companies of Canada have to meet this form of competition as best they can.

I can only refer to this in a cursory way, for this **Electricity** is one of the newer hazards which have to be dealt with by experts. The modern tendency towards specialisation has reached the Fire Insurance business, and we underwriters have to pay special brains to do special work. Canada being a country of numerous and great water-powers, and water-power being less costly than steam-power, it follows that by water-power electricity can here be most cheaply produced, and its production is increasing. In 1898 there were in Canada 259 electric light and power companies. (I quote from Dr. Johnson's Statistical Year Book). In 1902 there were 315. It is safe to assume that a large number of these used water-power, but whether water or steam, they produce electricity, that undefined force, even the effects of which are only partly understood. At Montreal a potential of nearly 75,000 volts is thrown into the transforming stations of three electric companies, there to be transformed into the standard potential of 2,000 volts, to enter the city and flow through numberless wires. At Quebec the voltage is 30,000, at Hamilton 25,000, at Three Rivers 12,000. The tendency of companies is to generate high voltages so as to overcome the difficulty of long-distance transmission. The transforming stations are so situated that the high potential does not, under proper conditions, enter the city or town; but what if a breakdown occurs, if the transformers give way? Careless wiring unfortunately exists, and in spite of precautions much Cheap John work of this kind continues to be done. Montreal has been characterised by an eminent electrical engineer as the most poorly wired city on the North American continent. *Surely* it will require effort to solve this problem. A rough and ready engineer on a river steamboat was jokingly asked what he would do if he "found a vacuum in his boiler." He replied—"I'd chase the darned thing into a corner and knock its brains out." Unfortunately, stray electrical currents cannot be treated in this way.

One would naturally suppose that Insurance was **Government** of sufficient importance to have been left to the sole **Supervision**, jurisdiction of the the Dominion Government, but **Legislation**, this, unfortunately, was not made clear by the British and Taxation. North America Act. Though the Dominion Government afterwards assumed jurisdiction and have since exercised it, some of the Provinces also have taken

upon themselves to do a little Insurance legislation of their own, and there is no one to say them nay. I say "a little," but to us it seems too much, and in fact we resemble the workman who had so many bosses that he could not serve one without offending the other. The tendency of the day on this continent is to legislate to extremes, particularly in regard to Insurance matters. Our confreres to the South, where any State Government that has not done something in this way is regarded as unique, if not incapable, have christened such legislation "Paternalism," presumably because it treats Insurance Companies as children; but paternalism that punishes more than it protects is apt to fail in its object.

I had hoped to furnish you with information as to the requirements of and the restrictions imposed by all Governments, Dominion and Provincial, but I have not had the time to do so in detail. Besides the requirements of the Dominion Insurance Department, we are called upon by various Provincial Governments to do many things. Ontario, Nova Scotia, Manitoba, the North-West Territories and British Columbia oblige us to use standard policy conditions within their several limits. Fortunately, there is little variation between the forms prescribed. Taxation in one form or another prevails generally, and one Company having a premium income of about 300,000 dols. shows its year's tax payments to have exceeded 4500 dols., or over $1\frac{1}{2}$ per cent. on its revenue. This includes city, town and municipal taxes, which in many cases are very burdensome. There are, too, Provincial requirements as to returns which it is absolutely impossible to literally comply with. We stand these things because we have to; we are long suffering and good-natured, but of all these well meaning, though mistaken Legislatures, we may sing with the poet Gay—

"How happy could I be with either,
Were t' other dear charmer away."

The word "conflagration," which literally means Conflagration a burning together, and, in a freer sense, a great Hazard.* fire, has an unmistakable significance to Canadian Fire Underwriters. Canada, in many ways a great country, and destined to become still greater, has been marked

* I have to thank Mr. E. P. Heaton (who was originally chosen to prepare a paper on the subject dealt with in these pages, but was unavoidably prevented from doing so) for kindly lending me such notes as he had made in regard to "Conflagration Hazard."—C. R. G. J.

by her great conflagrations. It is related that an Irish immigrant, just landed with his wife on our shores, seeing a rosy bunch of toy gas balloons in the hands of a vendor of those articles, exclaimed, "Murder, Biddy! look at the size of the coorants in this country." I have no doubt this naive Hibernian had an early opportunity to comment in like manner upon our conflagrations. From 1877, when the great fire of St. John, N.B., cost the Companies about 6,700,000, dols., down to the present time, we have eminently distinguished ourselves in this respect, Quebec, St. Sauveur, Toronto, Windsor, N.S., New Westminster, B.C., St John, N.B., Ottawa, Hull, and Montreal have all contributed to the fire fiend, and we know not which city or town may next join the throng.

There is a feature in connection with this hazard which would seem to be well worth considering: that is, the concentration of values in relation to the fire loss, and as bearing upon the question of concentration we must consider population. I have here inserted some statistics of the population of various countries; with some of these figures I fear I must trouble you.

POPULATION OF COUNTRIES.

	Area in Square Miles.	Population.	Persons to the Square Mile.
United Kingdom, Great Britain and Ireland, -	121,371	41,605,220	343
England and Wales, -	58,308	32,526,075	558
Scotland, - - -	30,406	4,472,000	147
Ireland, - - -	32,353	4,456,546	138
United States, - -	3,610,035	76,149,386	25
Cape Colony, - -	292,211	2,265,556	8
Natal, - - -	27,370	929,970	34
Australasia, - - -	3,188,600	5,505,400	2
Canada (1902), - -	3,745,574	5,456,931	1.5
Austria Hungary, -	240,942	45,310,835	188
Belgium, - - -	11,373	6,815,054	599
Denmark, - - -	15,289	2,464,770	161
France, - - -	204,092	38,961,945	191
Germany, - - -	208,830	56,356,246	270
Italy, - - -	110,646	32,449,754	293
Russia in Europe, -	2,095,616	106,225,138	51
Spain, - - -	197,670	18,089,500	92
Sweden and Norway, -	297,321	7,376,321	25

CANADA POPULATION—INCREASE.

1871	-	-	3,485,761	..
1881	-	-	4,324,810	18·97 per cent.
1891	-	-	4,833,239	11·76 "
1901	-	-	5,371,315	11·14 "

VARIATION OF POPULATION IN CANADA, BY PROVINCES
IN TEN YEARS.

Prince Edward Island,	Dec.	5·34 per cent.	} Census 1891-1901.
Nova Scotia, -	Inc.	2·04 "	
New Brunswick,	-	3·06 "	
Ontario,	-	3·25 "	
Quebec,	-	10·77 "	
Manitoba,	-	67·16 "	
British Columbia,	-	81·98 "	
Districts,	-	113·86 "	

Ontario.—Out of the 89 Electoral Districts, 52 *Changes in* show *decreases*, ranging from 17·7 per cent. in West *Population,* Bruce to a merely nominal decrease of 0·01 per *Census 1901.* cent. in North Ontario. 11 Districts show decreases of from 10 to 15 per cent., 21 Districts from 5 to 10 per cent. 37 Districts show *increases*, ranging from a mere fraction to 103·4 per cent. in Nipissing; 14 Districts 5 per cent. or less, 9 from 5 to 10 per cent., 7 from 10 to 15 per cent., and 7 more than 15 per cent., the greatest being Algoma 70 per cent., Nipissing 103·4 per cent., Muskoka and Parry Sound 27 per cent., Ottawa City 35·6 per cent., and West York 28·4 per cent.

Quebec.—Out of the 66 Districts 47 *increased*, from a mere fraction in Montmagny to 100·4 in Maisonneuve; 22 Districts increased less than 10 per cent., 16 from 10 to 20 per cent., and 10 over 20 per cent., the highest being 30·4 per cent. Beauharnois, 30 per cent. Chicoutimi and Saguenay, 59 Hochelaga, 34·3 Jacques Cartier, and 100·4 Maisonneuve. 18 Districts show *decreases*, from 17·3 per cent. in Rouville, to 0·7 per cent. in Chateauguay.

New Brunswick.—9 Districts show *increases*, from 0·47 per cent. in Kent to 27·42 per cent. in Restigouche. 4 Districts show *decreases*, from Sunbury and Queen's 5·63 per cent. to King's 6·20 per cent.

Nova Scotia.—7 Districts show *increases*, the highest Cape Breton, 43·6 per cent.; the lowest Digby, 2·1 per cent. 10 Districts *decrease*, the greatest Antigonish, 15·5; the smallest Annapolis, 2·6 per cent.

Prince Edward Island.—All Districts decreased; the greatest 8·6 per cent., the least 1·2 per cent.

British Columbia, Manitoba, Territories.—All Districts increased. Highest increase 222·67 per cent.; the lowest 28·17 per cent.

The total premium income and total amount insured, for specified years, of all Fire Companies reporting to the Dominion Government were as follows:—

Year.	Premiums.	Amount Insured.
	Dols.	Dols.
1870	1,916,000	199,102,000
1880	3,479,000	384,051,000
1890	5,836,000	620,723,000
1900	8,331,000	803,428,000
1902	10,577,000	892,049,000

One deduction we may draw from the figures submitted is that the general tendency of population is towards greater increase in the West than in the East. On the other hand, we know that our premiums in the larger centres have increased, and this clearly indicates a concentration of values in these centres, which indeed we know *has* taken place in certain well-defined sections of the larger cities. It is as though a farmer had crowded all his crops into one barn, either for lack of ground to build another on, or because he himself were too busily engaged in the pursuit of wealth to attend to the matter. Thus we are collecting in our cities more and more inflammable material, concentrated within certain areas, and it is in these areas where our conflagration hazards will evince themselves.

What preparation shall we make for these days that are to come? What preparation *can* we make. We are accustomed to balance our yearly accounts, and having paid our losses and expenses and charged ourselves with re-insurance reserve, to call the rest, if there be any, "profit." But how much of this profit, how much more *than* it may we not soon be called upon to pay out for conflagrations? We have at once to guard our interests in the East, and yet to keep our anxious eyes turned towards the West, with its hurried construction of frame towns and the

feverish and careless haste of its inhabitants. Verily, of all our problems *this* is the greatest.

With regard to the variations of profit and loss in Canada, I have inserted at the end of this paper a copy of a Chart, which accompanied a most interesting paper, by Mr. Chas. D. Cory, read before the Insurance Institute of Toronto on 8th December last, and entitled "Fire Insurance as an Exact Science." I have also quoted that portion of Mr. Cory's address which explains the chart. I am greatly obliged for permission to use these.

I do not know that I can add anything worth reading to Mr. Cory's remarks upon the range of profit and loss in Canada, but perhaps I might close by giving vent to one or two reflections.

Why do the heathen rage, or, perhaps I should say, why do the public cry out when the Fire Insurance Companies make an occasional or temporary profit! I cannot tell, for it needs but little trouble to learn from official returns how poor the results of the business have been. But, nevertheless, we never have a particle of success that is not followed by an outcry for lower rates. Of ourselves, and to the public, we can truly say, quoting from Kipling,—

"We didn't begin with askings. We took our job
and we stuck,

And *we* took the chances *they* wouldn't and now
they're calling it luck."

And, finally, what are problems after all? The spice that seasons our lives, and brings out our best qualities! Too much spice, did you say? Well, perhaps so.

MR. CORY'S REMARKS.

"I assume that Fire Insurance as a trade should yield each year, on an average, a trade profit of at least seven and one half per cent. That is to say, that the net losses, plus expenses, should not exceed $92\frac{1}{2}$ per cent. of the net premium income, and you will therefore note a broad line extending right across the Chart from left to right opposite the $92\frac{1}{2}$ per cent. ratio. This we will call the "Plimsoll Line"—the loading line of safety. The straight black line running across opposite the 60 per cent. ratio represents the "Safety Line" so far as losses alone are concerned. The lower

irregular zig-zag line represents the actual movement of the loss ratio over the thirty-four year period, and the upper zig-zag the combined loss and expense ratios over the same period. The line across the Chart at the 100 per cent. ratio of course represents the net Premium Income, and to the extent to which our zig-zag crosses this line above or below, to that extent has the trade of Fire Insurance in Canada been either out of pocket or had "money to burn."

"To contemplate this picture of a dead past would be wholly useless unless we can extract from the cold facts therein embalmed some data that will serve to guide us into more profitable ways in the future.

"In the first place, by dividing the total period covered by this Chart into three fairly equal periods of time, we find that for the first eleven years there was an average annual trade loss of 16.66 per cent. During the next eleven years the very fair annual average trade profit of 6.65 per cent. obtained, and during the final twelve years an annual average trade profit of 1.20 per cent.—the average over the entire term of 34 years showing an annual trade loss of 48/100 of one per cent.

"The great conflagration in St. John, N.B., in June, 1877, of course accounts for the abnormal jump in that year's loss ratio depicted upon the Chart, but it must be borne in mind that the annual premium income then obtaining was only a little over one-third of that for the year 1902, and that, while the loss ratio of 1877 stands recorded as having been 225.58 per cent. of the net premium income of that year, of which the St. John fire alone constituted 173 per cent., a conflagration of equal magnitude occurring in 1902 would have called for but 62 per cent. of that year's net premiums."

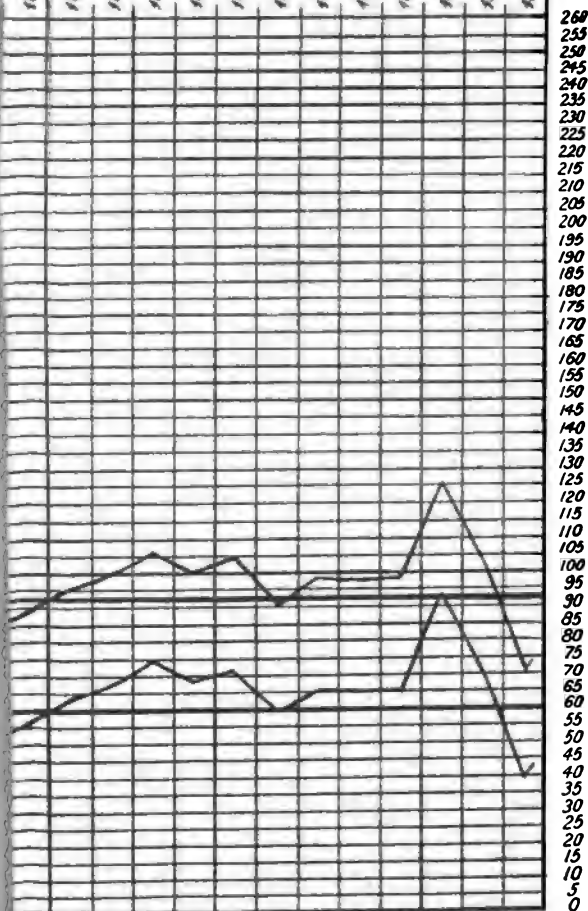
aper.

et result, Dr 0.48

12 Years - Average 98.80

Net result, Cr 1.20

1890 - 55.97 - 88.47
1891 - 63.31 - 95.81
1892 - 67.22 - 99.78
1893 - 74.37 - 106.81
1894 - 68.38 - 100.20
1895 - 71.92 - 104.42
1896 - 58.98 - 91.48
1897 - 65.69 - 98.19
1898 - 65.09 - 97.59
1899 - 65.51 - 88.01
1900 - 63.31 - 125.81
1901 - 70.20 - 102.70
1902 - 39.26 - 71.76

Average Loss Ratio
for 34 years 67.98

•

-

AUTOMATIC SPRINKLERS AND THEIR WATER SUPPLIES.

By W. E. ASTLEY.

*A Paper read before the Insurance Association of Manchester,
April 14, 1904.*

WHEN I promised to read a paper on automatic sprinklers and their water supplies, I am afraid I scarcely realised the importance of the undertaking.

So far as sprinkler heads are concerned, it would appear that a description of the sprinklers which have been passed by the Offices would be sufficient, as it is not absolutely necessary for a Surveyor to be able to do more than recognise the approved heads. To confine myself to a mere description of the approved heads would be a simple matter, but would not serve any useful purpose; and as the testing of sprinklers is now done by the Offices, it is advisable for the young Surveyor to take a more intelligent interest in the subject.

I shall therefore endeavour to explain the principles which underlie the construction and operation of all automatic sprinklers, and to show what conditions must be fulfilled in order to get satisfactory results.

In connection with water supplies, the greatest difficulty has been experienced in deciding who should be taken as an authority. Unfortunately, each authority appears to be a law unto himself, and after mature consideration I decided to confine my remarks strictly within the limits of my own knowledge.

It may here be advisable to warn you that no matter how dogmatically a statement may be made it must be distinctly understood to be an expression of opinion only.

In dealing with the subject, it will be convenient to divide it under the following heads :—

- I. Sprinkler heads.
- II. Erection of sprinklers.
- III. Capacity of a sprinkler installation to extinguish a fire.
- IV. Water supplies.
- V. Valves; testing cock; gauges.
- VI. When to shut off the water supplies of a sprinkler installation.
- VII. Water supplies for ordinary appliances.

Sprinkler Heads. Sprinkler heads should fulfil the following conditions:—

1. They should open promptly in the event of a fire.
2. They should not be easily rendered inoperative.
3. They should distribute the water uniformly over the whole area which they are intended to protect.

In designing or testing a sprinkler intended to fulfil these conditions, due consideration must be given to the factors which, directly or indirectly, operate against successful action, such as impure water, internal or external corrosion, age, and position.

An extensive knowledge of mechanics and chemistry is necessary to thoroughly appreciate all the actions which may take place. Without, however, actually forecasting all the effects which may arise, it is possible with our present knowledge to lay down rules which, if carried out, would reduce to a minimum the possibility of failure, and produce a sprinkler which would be theoretically sound and give good practical results.

Such a sprinkler would be composed of a number of parts, each of which would carry out some important function.

1. The valve would hold back the water so long as the levers remained in position, and would fall immediately the levers were removed.

As the valve is constantly in contact with water, it would be composed of a material which could not be adversely acted upon by any water which may be used.

2. The levers would hold the valve firmly on its seat, but would fall immediately the fusible joint operated.

To satisfy these conditions, the levers must be made sufficiently strong to stand any ordinary strain which may be put upon them, and must not be adversely affected by age or corrosion.

3. The fusible joint would hold the levers in position, and release them promptly in the event of fire only.

We must, then, have a mechanically strong joint.

It must be placed in such a position that it cannot be easily damaged.

It should be built of thin metal parts, so that their temperature may be quickly raised to the melting point of the solder which may be used.

The joint should not be in metallic contact with heavy metal parts, or parts containing water, as these conduct heat rapidly away from the joint, and the action is retarded.

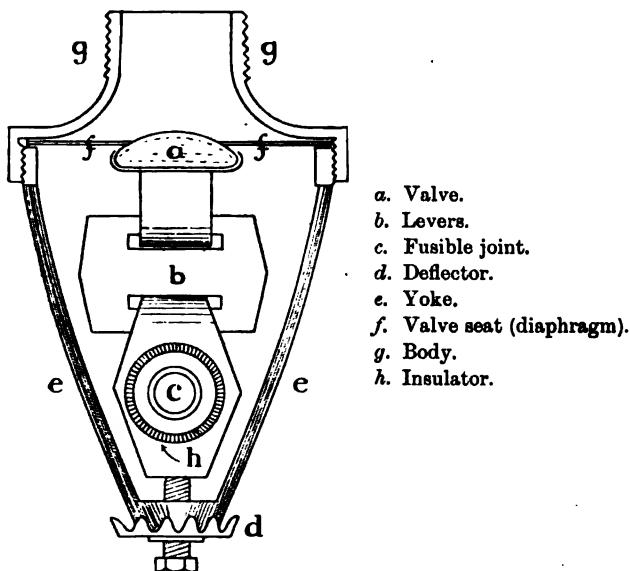


DIAGRAM OF A SPRINKLER.

It will be obvious that, if the joint is in contact with parts which conduct heat, it will be necessary to use a very soft solder and make a mechanically weak joint, or, if the joint be made strong, it will be somewhat slow in its action.

If the joint be insulated it is possible to make it mechanically strong, and also sufficiently sensitive to operate quickly.

4. The deflector would be built of hard metal; it would have a fixed position, and be so shaped that it would distribute the water uniformly over the whole area intended to be protected.

The position of the deflector is the only debateable point, and opinions may differ; personally, however, I am confident that a fixed position is the only reliable method.

It may be interesting to note that all the old sprinklers with moveable deflectors have either been withdrawn or have been superseded by approved types having fixed deflectors.

5. The yoke would carry the deflector, levers, and valve, and would be sufficiently strong to stand any strain which may be put upon it, and it would protect the parts from external injury.
6. The valve seat, in combination with the valve, would make a water-tight joint under any normal pressure, and would not stick to the valve.

A flexible valve seat, in the form of a diaphragm, is undoubtedly the best.

The diaphragm readily accommodates itself to great differences of pressure, and the constant bending, due to changes in the pressure, reduces to a minimum the probability of the valve sticking. The area of the diaphragm increases the initial pressure on the valve, which also assists the opening of the sprinkler.

A simple rigid valve seat, where the removal of the valve depends solely on the pressure of water on a half-inch orifice, is to be avoided. If, however, the valve be provided with an external spring to assist in the removal, it is found to work well in practice.

7. The body would be provided with a screwed end for attachment to the distributing pipes, and would carry the yoke, deflector, levers, fusible joint, and valve.

It would be mechanically strong, and would protect the various parts from external injury as much as possible.

We have now discussed the component parts of a sprinkler, and the functions they are expected to perform, and it will be seen that—

- A perfect sprinkler must have a mechanically strong body, a flexible valve seat, or the removal of the valve must not depend solely upon the pressure of the water in the installation.
- The valve should not be liable to corrosion owing to contact with any water which may be accepted as a satisfactory water supply, or be liable to stick to its seat from mechanical contact.
- The levers should not be affected by age, or be liable to corrosion.
- The fusible joint should not be in metallic contact with heavy metal parts, or parts containing water.
- All moveable parts should be external to parts containing water.
- When the head opens all moveable parts must fall clear of the sprinkler when it is fixed in either a pendant or upright position.
- The deflector must be made of hard metal, and should have a fixed centre. It may either be fixed or may revolve, but must not move vertically or laterally.
- The sprinkler, when under a 15 feet head of water, should give a practically uniform distribution over the whole area it is intended to protect, and the uniformity of the distribution should not be materially affected by an increase of pressure.
- The sprinkler should give satisfactory results after being artificially aged by being charged with a saturated solution of sal-ammoniac under tank pressure for 30 days and then allowed to dry.

As the efficiency of a sprinkler may greatly depend upon the size and dimensions of its parts, no alteration should be permitted without special sanction. Standard parts should be kept for reference, and the sprinklers should be verified from time to time.

Sprinklers must be erected in accordance with

Erection of Sprinklers.	the rules of the Offices. These rules are clearly defined, and do not require any further explanation.
------------------------------------	--

There is one point, however, that I should like briefly to touch upon, and that is the spacing of sprinklers. At the present time it is customary to fix a certain number of heads irrespective of the height of the sprinklers. Now the weakest point in any installation is at the level of the highest sprinklers fitted, owing to the fact that the pressure at this point is the lowest, and the quantity of water which can be delivered by a sprinkler is

considerably less than what would be delivered on the ground floor of a six-storey building.

If then, we assume that the present rules for spacing give adequate protection in the top room, it follows that our lower floors are over-protected. Over-protection may be quite as bad, or even worse, than under-protection, owing to the danger of overloading the supply, and also to the increased water damage in the case of small fires.

We may now consider how far a sprinkler installation may be relied upon to extinguish a fire; this is a most important point, and it is the basis upon which the size of the distributing pipes and the water supplies should be fixed, and until the limit is known it is impossible to determine with any accuracy the risks which may be protected.

Given an unlimited volume of water at an adequate pressure, the capacity of a sprinkler installation to extinguish a fire is unlimited. Unfortunately, this condition is never met with in practice, and we have therefore to be guided by the average conditions which obtain, and fix an arbitrary limit.

If sprinklers are properly installed, and kept constantly charged with water at an adequate pressure, the records show that 80 per cent. of the fires are controlled with less than ten heads, and I think it is fair to assume that if a fire is to be put out by sprinklers alone, it must be extinguished before more than 20 heads have opened.

One sprinkler, 20 feet below the level of the tank water, will deliver approximately 10 gallons of water per minute, and about 20 gallons per minute will be delivered when the sprinkler is about 70 feet below the level of the tank water. Taking an average delivery of, say, 15 gallons of water per minute, 40 sprinklers would require the full capacity of the largest fire pump required by the rules of the Offices.

If, then, we take the average capacity of towns' mains as equivalent to the largest fire pump required by the rules, our maximum limit would be 40 sprinklers. On this basis we could divide our risks into three classes.

Normal risks in which it is improbable that a fire will extend over a greater area than 2000 square feet before the sprinklers come into full operation.

Hazardous risks in which a fire may extend rapidly over an area exceeding 2000, but not exceeding 4000 square feet, before the sprinklers come into full operation.

Extra hazardous risks in which a fire will probably extend over a greater area than 4000 square feet before the sprinklers come into operation.

Normal risks may be adequately protected, and the sprinklers may be relied upon to extinguish a fire.

Hazardous risks cannot be adequately protected, and the sprinklers cannot be relied upon to extinguish a fire, unless it is controlled at an early stage.

There should be a skilled private brigade with adequate appliances. The alarm must be sensitive and give instant warning in the event of a fire, so that the brigade may get ready to give the best possible service if the fire extends beyond the capacity of the sprinklers.

Extra hazardous risks.—No reliance can be placed on sprinklers in these risks, and they may even introduce a serious risk through spreading a fire, and weakening the supplies for the ordinary appliances.

Towns' mains. — Before a town's main be
Water Supplies. accepted as a supply for a sprinkler installation, satisfactory proof should be given that it will deliver a given quantity of water at an adequate pressure at the level of the highest sprinkler to be fitted.

At the present time, if the main be of the required diameter and the static pressure sufficient to give 10 lbs. to the square inch on the top sprinklers, the supply may be considered satisfactory. The static pressure at any point will give an approximate idea of the height of the source of the supply above the point under test, but gives no idea of the volume of water which may be delivered, and unless this volume be known it is impossible to form any conception of the supply as a fire extinguisher. It is possible to have a static pressure far in excess of the requirements, which will fall enormously when a small pipe is opened.

It is clear, then, that we must have an adequate pressure and also a sufficient volume of water to supply the number of sprinklers which may be fixed as the outside limit. We have taken 40 sprinklers as the maximum, and as this number may be called into action, even in a normal risk, we must satisfy ourselves that our supplies are sufficient to feed at least 40 sprinklers.

We have seen that the quantity of water delivered per minute by each sprinkler depends upon its height, being about $7\frac{1}{2}$ gallons when the pressure is about 7 lbs. to the square inch, and increasing as the pressure increases, consequently, we require more water to supply 40 heads on the ground floor, than what would be required for the same number on the top floor. It will be seen, however, that if we can get sufficient water to feed the maximum number of sprinklers on the top floor, it follows that the supplies for the lower floors must be satisfactory. We have therefore to provide 300 gallons of water per minute at a running pressure sufficient to give 10 lbs. to the square inch at the level of the highest sprinkler fitted. Now, a three-inch pipe will deliver at least 300 gallons of water per minute when fed from a tank 20 feet above the point of delivery. The base of a sprinkler tank is seldom more than 15 feet above the highest sprinkler fitted, but the tank generally contains about 5 feet of water, giving an initial head of 20 feet, and providing an excellent standard for comparing the pressure of the primary supply.

If the primary supply be capable of delivering, say, 300 gallons of water per minute at a pressure of 10 lbs. to the square inch at the level of the highest sprinkler, the pressure on the tank side of the tank back-pressure valve would be less than the pressure on the installation side of the said valve when a 3-inch pipe on the installation side of the alarm valve is full open, and no water would be drawn from the elevated tank.

I may mention that the fact of no water being drawn from the tank is no guarantee that the installation pressure is the greatest, as all back-pressure valves are more or less differential, the installation side of the valve having a greater area than the supply side, consequently a smaller pressure in the installation will hold the valve shut against a higher pressure from the tank. The difference between the two pressures depends upon the ratio of the two areas.

If a 3-inch running test be adopted, a pressure gauge would have to be fixed on the tank side of the tank back-pressure valve, or some mechanical device fixed which would give an alarm when the tank pressure is greater than the pressure in the running primary supply.

Hitherto the capacity of a fire pump has been
Pumps. decided by the area of the water rams, and may
be passed if capable of delivering the required

quantity of water at the level of the pump only. From the size of the rams it is impossible to form any conception of what a pump may be able to do, unless the area of the steam cylinders and the steam pressure be also known.

All fire pumps should be carefully inspected and tested when first installed.

The steam pressure should be adequate and always available.

The steam pipe conveying steam to the pump should be sufficiently large to drive the pump on full load when the steam boilers are at their lowest pressure. It should be efficiently trapped, so that water cannot be carried over into the steam cylinders.

The pump should be in a separate building, easily accessible, and as near the boiler house as possible.

It should be capable of maintaining a pressure in excess of the tank pressure when a 3-inch pipe is full open.

In order to test the capacity of the pump to withstand sudden increases of pressure, it should be run for a time under a pressure of a 150 lbs. to the square inch, the size of the outlet being adjusted accordingly. An additional length of hose should then be attached, and the valve opened and shut rapidly. If the pump will stand this test, it may be relied upon to do good work when called upon.

After the pump has been tested and found satisfactory, it should be run at a speed of 150 feet per minute with the relief valve full open, and the mean pressure should be recorded for future reference.

If the pump be tested in this manner once a week, it would be readily seen when it required attention.

We have very little experience of these as supplies for installations, and the Offices have wisely insisted upon each case being specially submitted.

The theory of an injector is complicated, and the ultimate capacity cannot be calculated with great accuracy. These, however, are points which interest the makers only. If it be well designed, and satisfies our conditions, there is no objection to an injector as a supply to a sprinkler installation.

All supplies which are regarded as unlimited
Stop Valves. should be fitted with stop valves, which should be easily accessible at all times and should not be fixed inside the main buildings.

Alarm valves should give an immediate and **Alarm Valves.** continuous alarm, and should be so proportioned that they cannot be waterlogged.

To make clear the effect of waterlogging, we will assume that the area of the orifice immediately below the valve is 28·374 square inches, and the diameter of the valve-seat $7\frac{1}{8}$ inches, giving an effective area on the top of the valve of 39·871 square inches. In this case it would require a pressure of nearly 14 lbs. to the square inch to lift the valve against a pressure of 10 lbs. to the square inch.

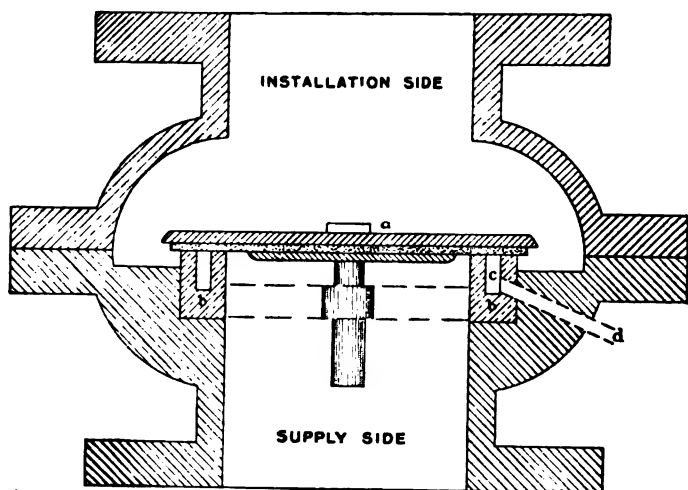


DIAGRAM OF AN ALARM VALVE.

- a. Valve.
- b. Valve seat.
- c. Circular passage in valve seat open to alarm bell.
- d. Pipe to water motor in connection with alarm bell.

The following Table gives the pressures above and below an alarm valve of the dimensions stated, when under tank pressure only, commencing with a tank 25 feet above the alarm valve, and rising by intervals of 10 feet to 115 feet :—

Height of tank to level of water.	Pressure below alarm valve.	Height of sprinkler.	Pressure above alarm valve.
30 feet.	360 lbs.	10 feet.	170 lbs.
40 "	480 "	20 "	340 "
50 "	600 "	30 "	510 "
60 "	720 "	40 "	680 "
70 "	850 "	50 "	850 "
80 "	970 "	60 "	1020 "
90 "	1090 "	70 "	1190 "
100 "	1210 "	80 "	1370 "
110 "	1330 "	90 "	1540 "
120 "	1450 "	100 "	1710 "

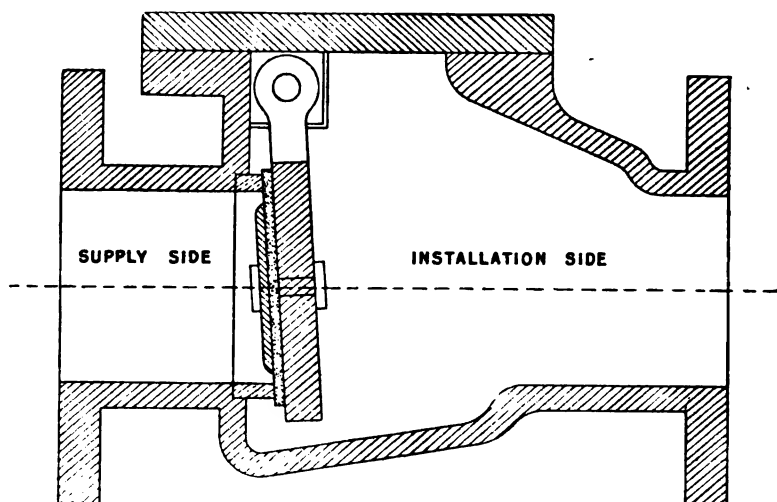
The depth of water in the tank has been assumed to be five feet.

This Table shows that when sprinklers are fitted 50 feet or more above an alarm valve of the dimensions stated the height of water in the installation is sufficient to hold the valve shut against the tank pressure, and the valve is waterlogged so far as the top sprinklers are concerned.

A waterlogged valve is absolutely dangerous when used in connection with a tank and non-automatic pump, as in the event of a fire in the top room the valve would never lift under tank pressure, and the sprinklers would be without water. Such a valve will lift when tested in the usual way, but the test is useless owing to the position of the testing cock, which, when open, merely reduces the head of water in the installation until the pressure below the valve is greater than that above. Immediately the valve lifts water rushes into the pipes until they are again full, or the column of water is sufficient to close the valve and stop the alarm, and until the excess of head is drained off the alarm will not ring. The table of pressures shows that the height of the column of water which will close the valve is below the level of the highest sprinkler, and all sprinklers above this height are useless, for the simple reason no water can pass the valve.

Back-pressure valves should be easily accessible.

The tank back-pressure valve should be so proportioned that the weight of water in the installation cannot hold the valve shut against the tank pressure.



BACK-PRESSURE VALVE.

The testing cock should be connected at the **Correct position** highest point of the distributing pipes, and no of **Testing Cock**. alarm or tank back-pressure valve should be passed which will not lift under tank pressure when the half-inch test cock is opened.

At the present time all installations have to be **Gauges.** fitted with three pressure gauges to indicate the pressure in the installation, below the main stop valve, and also the primary supply, and from the pressures recorded by these gauges it may be seen when the valves are in order and the supply satisfactory.

The value of the test depends solely upon the accuracy of the gauges, which are often found wrong, and great care should be taken to see that the readings are correct before recording the pressures.

All installations should be fitted with an alarm **When to shut** which will ring immediately the tank comes into off the water operation, and continue to ring until the tank is supplies of a empty. Such a device would indicate, if the **Sprinkler In-** primary supply was shut off, when a fire was stallation. spreading beyond the capacity of the primary supply, and when the tank is empty. Immediately the tank is empty, as shown by the stoppage of the alarm,

all water supplies should be shut off from the sprinklers, so that the best possible service may be rendered with the ordinary appliances.

A little consideration will show that immediately the tank comes into operation more sprinklers have opened than the primary supply can feed properly, and when the tank is empty it follows that the distribution from the sprinklers, which are then fed by the primary supply only, must be unsatisfactory. Water will be pouring out of the sprinklers near the main feeds, whilst those at the ends of the ranges may be practically without water. The fire may then continue to spread, and will probably open more sprinklers, but owing to the already overloaded state of the installation no water may reach them.

It is undoubtedly the best policy to shut off the supplies when the installation is hopelessly overloaded, as shown when the tank is empty, so that the water may be used for ordinary appliances which can be brought to play upon the actual seat of the fire.

In dealing with water supplies we have so far taken into consideration the sprinklers only, but for Ordinary Appliances, as sprinklers cannot always be relied upon to put out a fire, we must satisfy ourselves that the primary supply is satisfactory for ordinary appliances, which have to deal with entirely different conditions to those which obtain in sprinkler installations.

If care be exercised in selecting our sprinklers, and the installation be erected on proper lines and maintained in good order, the sprinklers should be allowed to deal with the fire, and ordinary appliances should not be used until the primary supply begins to fail, except in cases where it can be clearly seen that ordinary appliances would be useful.

When the tank is empty the supply to the installation may be shut off, and would be available for ordinary appliances.

The question of what is an adequate provision is a very debatable point; I think, however, that if a supply will maintain four $\frac{3}{4}$ -inch jets, or their equivalent, at a pressure to reach the highest point of the premises, it would give all the protection that can be expected.

I have endeavoured to suggest reliable methods of testing which can be easily carried out, and have avoided technicalities as much as possible. If a more extensive knowledge be desired, it would be necessary to make a special study of the problems involved, which

are complicated, and require more space than can be given for a paper of this description.

This paper is not intended to be a complete treatise, many of the points raised being matters of opinion and probably capable of great improvement. I hope, however, it may be the means of inducing some of the younger members of the profession to make a special study of the principles which underlie all sprinkler installations, and that it may form the basis of a more pretentious work.

GUN AND SMALL-ARMS FACTORIES.

By A. E. PATRICK.

*A Paper read before the Insurance Institute of Birmingham,
29th April, 1904.*

IN this paper, which I have had the honour of preparing for our Institute, I have endeavoured to give you an idea of the various trade operations, and at the same time point out to you the risk of fire attending each stage of gun, pistol, and rifle making. A description of any trade process can readily be obtained from books of reference, but I know of no works—with the exception of the volumes of the Federation Journal—which throw any light upon the fire risk involved. Personally, and I trust I am not alone in my opinion, I regard the volumes of the Federation Journals as most valuable and instructive books of reference; and in the paper I now have the pleasure of reading to you, I have endeavoured to point out the dangers usually found in gun and small-arms factories. The title is taken to mean the manufacture of Sporting Guns, Military and Sporting Rifles, Pistols and Revolvers. Swords and Bayonets are not dealt with, being entirely distinct trades. The military definition of small-arms is arms as distinguished from cannon, and in this paper I have endeavoured to keep as far as possible to these items. It is impossible, however, to deal with a subject such as the present one and make the article interesting unless certain latitude is allowed, and I must therefore crave your indulgence if in my endeavours to present an interesting and readable contribution matter is introduced which may appear somewhat outside the pale of the title of the paper. The city of Birmingham has been noted for the manufacture of firearms for centuries past, and at the present time more guns are made in this city than in any other city or town in Great Britain. In fact, I think I am correct in stating that Birmingham supplies more guns than any

other town in the world, with one exception, viz., Liege, whose annual output exceeds our own by ten to one. From these remarks you will perceive that the subject allotted to our Institute is a particularly appropriate one. The forerunner of all small-arms was undoubtedly some kind of cannon, the use of which is believed by some writers to have been understood by the ancients. Their accounts are, however, somewhat unreliable, and I propose, therefore, to deal only with cannon and afterwards small-arms as from their introduction in Europe.

The first mention we have of the use of cannon in Europe is in 1247, when Seville was defended by cannon throwing stones. Milba, also in Spain, was defended in 1259 by a machine resembling cannon. Abou Yousof also used cannon throwing stone balls at the siege of Sidgilmessa, and in 1308 Ferdinand IV. of Castile employed guns at the siege of Gibraltar. In 1311 Ismail attacked Bazas, a town of Granada, with machines "throwing balls of fire with a noise resembling thunder." These notices seem to confirm the opinion that the use of cannon and gunpowder was known to the Arabs or Moors, and introduced by them into Spain, from whence it spread over Europe. The early cannon of Europe were known by various names in different countries. In Italy they were known as "bombardes," the French called them "quenon" or "canon," the Germans "büchsen" or boxes, and the Netherlands "vogheleer" or "vengliares." Besides these terms there were many others, but in the 15th century the cannon were classified and named according to their size. Cannon were not adopted or manufactured in France until 1338, and for many years afterwards the nations using them were regarded by the French as "barbarians." Wrought-iron was most generally used in the manufacture of early cannon, but in 1378 a founder named Aran of Augsburg in Germany cast cannon of a metal composed of copper and tin. At the siege of Constantinople in 1413, Mahomed II. is stated to have used an enormous cast-iron cannon having a bore of 48 inches and throwing a stone ball weighing 600 lbs. In the Musée des Invalides, Paris, is a cannon built of pieces of wood bound round with iron rings which was brought from Cochin China. Considering the slow advance of civilisation in China until recently, it is quite within the bounds of probability that this identical form of cannon was used by these people many centuries prior to the introduction of cannon into Europe. Within the last few days the Thibetans have endeavoured to oppose the

advance of our mission with some twenty leather cannon. How long they have been in their possession it would be interesting to know. In the arsenal of Venice is a large mortar composed of several thicknesses of coiled hempen rope, covered with a thick casing of leather. This weapon fired a shell of some 18 inches in diameter and was captured from the Turks. Mortars composed of paper, with an outside covering of leather, are preserved in the arsenal at Malta, and are rightly considered great curiosities. They are supposed to have been used in and previous to the Crusades, and are regarded as of Eastern manufacture. Space will not permit of my detailing and tracing the evolution of early cannon to the magnificent cannon now in use in the armies and navies of the first-class Powers; but I cannot pass this subject without making some mention of a cannon typical of the 15th century, of Flemish manufacture, and Scotch history, the renowned "Mons Meg" of Edinburgh Castle, with which many of you are doubtless acquainted, and which weighs nearly 4 tons, shooting a stone ball of something over 350 lbs. Several cannon of the Mons Meg type were imported into Scotland from Ghent during the 14th and 15th centuries, and history informs us that it was by the bursting of one of these cannon that James I. of Scotland met his death.

We have shown that cannon of various sizes and manufacture were the first kind of firearms in use. We will therefore proceed to the period when hand-guns or small-arms first began to be used. It is claimed by some writers that hand-guns were used at Crecy, but other students are of opinion that the arm referred to was a cannon of a semi-portable character which would be carried and used by three or four men. We have, however, to turn again to Eastern nations as the primary users of hand-guns, which they used for pyrotechnical displays in the first place and gradually brought same into use for military purposes, such as causing a disturbance in their enemies' ranks, frightening horses, and stampeding their cattle. An illustration of this weapon is found in the "*Dictionnaire Mobilier Francais*," and according to the description given was in frequent use by incendiaries, pillagers, and outlaws. The gun consisted of an iron tube some six feet long, covered with pieces of wood and bound round with hair, hemp, hide, or other suitable substance, the tube being fastened to a stick in order to handle it. The weapon was fired from the muzzle, and must have resembled a Roman candle, successively ejecting burning

wax and inflammable balls. In the year 1364 the Italians and Netherlanders manufactured "crash guns," which seem to have been used for simply making a report. A notice by Montaigne in 1585, when, of course, considerable improvements had been made, is interesting, that gentleman observing that he hoped the use of crash guns and hand firearms would be discontinued, the effect of firearms, apart from the shock caused by the report, to which one does not easily get accustomed, being so insignificant. In 1397 hand cannon seem to have been used by the French, Italians, and Netherlanders. These weapons consisted of a small bombarde affixed to a straight piece of wood, and fired from the shoulder by means of a match. A slight modification of this weapon rendered it applicable for use upon horseback. The German "Ritters" seem to have been the first to employ hand-bombardes or "petronels" from horseback, much to the astonishment and confusion of the French foot-soldiers. The next invention of any note is the hand culverin, which consisted of a forged iron barrel having a bore of about a half to three-quarters of an inch, which was attached to a stock of wood by five iron bands, and two side bridles fastening the trunnion or swivel band to the butt. These weapons appear to have been in very extensive use at the battle of Morat in 1476. The Swiss counted not less than 6000 culverins. The hand culverin, which was fired from a rest, required two men to manipulate it, one man (the culveriner) levelled and held the weapon, and his companion (the varlet or gougat) applied the priming and match. Several good specimens of these early culverins are to be seen in the Musée des Invalides, Paris. Small-arms were introduced into England by Edward IV. in 1471, when he landed at Ravenspur in Yorkshire, bringing with him 300 Flemings armed with hand-guns. This is about fifty years earlier than the date usually assigned for their introduction, many writers placing that event at the siege of Berwick in 1521.

The first English illustration of a hand-gun appears in the Royal MS. 18 E., fol. xxxiv., written in 1473. Guns, and more particularly hand-guns, met with great opposition. The French were perhaps the most bitter against them. One old French author says:—"No use has yet been made in France in 1547 of that terrible weapon against men. The French used it with good effect against some castles in 1338, but they would blush to employ it against their fellow-creatures. The English, less humane, without doubt outstripped us, and made use of some at the celebrated

battle of Crecy which took place against the troops of King Edward III. of England, who was so spiteful and treacherous that he plagued Philip de Valois and his troops to the last, and the greater part of the terror and confusion was occasioned by the cannon which the English used for the first time, and had placed on a knoll near the village of Crecy, and to which the French assign their defeat." Immediately after their introduction firearms were greatly dreaded by all classes. In King Henry IV., Shakespeare humorously alludes to them as follows:—

“And that it was a great pity, so it was,
That villainous saltpetre should be digg'd
Out of the bowels of the harmless earth.
Which many a good tall fellow had destroyed
So cowardly; and, but for those vile guns,
He would himself have been a soldier.”

Henry IV., Act I., Scene III.

The armoured knights of this period were strongly opposed to the use of firearms, for even their strong armour could not be made proof against heavy bullets. Many of them finding war had become such a rough pastime sought other professions, others grew accustomed to the firearms and took their chance. The musket, however, gave the *coup de grace* to their chivalry, and also threw the armourers into a state of alarm, perceiving that in the near future their occupation would be gone. Attempts were made from time to time to combat the effects of firearms by increasing the weight of armour, but in the end, the knights found themselves compelled to give way to the genius of the gunmakers who were causing such a rapid revolution in the ancient system of warfare. Gunshot wounds in these early days were considered to be all but fatal, but this, I think, can be accounted for by the unskilled surgery of the period. Some of the receipts for the cure of gunshot wounds were, however, much more likely to prove fatal than the wound itself. Here is one of them:—“Take of wine and oil equal parts, inject them into a living dog, well boil the animal and its flesh together with the oil, wine, and other ingredients, and form the application.”

It would take too long to trace the evolution of the hand-gun from its inception, up to the modern and up-to-date firearm. I must therefore content myself by giving you a list of the known small-arms, placing them in their proper order according to period:—

Hand cannon, 14th Century.

Early hand-culverin, close of 15th Century.

Culverins with side flash-pans, close of 15th Century.

Arquebus, 16th Century.

Matchlock gun, 16th Century.

Wheel lock musket, 16th Century.

Flint rifle arms, including pistols, 16th and 17th Centuries.

Flint musketoon, 16th and 17th Centuries.

Flint breech-loading muskets, 17th Century.

In the reign of William III. the flint-lock came into use in England, and from it was developed the renowned "Brown Bess," which for a century and a half was the regulation arm of the British forces. "Brown Bess," although considered to be good for a range of 200 yards, was indifferently accurate at 100 yards. Indeed, we have it recorded by the men who used such weapons that if you fired at the church, it was accounted a stroke of luck to succeed in hitting the parish. Little was expected of "Brown Bess," and she did that little well. She was easy to load even when foul, and with the exception of the rude lock, there was no mechanism to get out of order. In any case, she was a good handle for a bayonet, and compared with ancient rifles "Brown Bess" could hold her own as a military weapon. The flint-lock gun was in all probability invented in France about 1640, and was the immediate successor and outcome of the Snap-haunce method. The arquebus, a musket with the *chenappan*—a name corrupted from the German "*Schnapphahn*," a cock pecking—indicates the time of its invention, which was the latter half of the 16th century. It is recorded that monies were paid by the Chamberlain of Norwich to a gunsmith, Henry Radoc, who changed the wheel lock of a pistol to a snap-haunce. The name *Chenappan* was given in France to robbers who used the new weapon. The Spanish bandits of the Pyrenees who were enrolled under Louis XIII., were also called *Chenappan*. The snap-haunce method, which worked by sulphous pyrites, may therefore be looked upon as the forerunner of the French flint-lock, which is derived from it. Nearly all oriental arms, particularly Turkish guns, subsequent to this date were snap-haunces. During the 16th and 17th centuries rapid strides were made by the Continental gunmakers in the improvements of their firearms. The Spanish and Italian smiths excelled in the manufacture of barrels, a famous barrel maker of that period being Nicholas Bis, goldsmith to Philip V. of Spain, whose lowest price for a single barrel

—which, moreover, he did not mount—being £40. Most of the barrels of this period carry gold stamps or marks of the makers, the best known of whom are Nicholas Bis, Migona of Pistoja (a town in Tuscany from which the pistol is supposed to take its name; but another statement, to the effect that it is derived from the word “pistallo,” meaning pommel, seems to be the more probable), Gabriel de Algora, Aqua Fresca of Bargio, etc., etc. Some very beautiful examples of gunmaking were produced about this period, of which fine examples are to be found in the Birmingham Museum. A large amount of attention seems to have been devoted to the appearance of the arm at that time, and it will be observed that the stocks are often beautifully inlaid with ivory, mother-of-pearl, etc. As weapons of precision they, of course, could not compare with the guns and rifles of to-day, but the elaborate and artistic ornamentation and workmanship on the barrels, stocks, and locks, bear witness that the gunsmiths and metal artists of that time were not deficient in talent or skill. Their weak point was in the barrel. Upon the examination of a fine public collection of ancient firearms by a practical gunmaker, it was found that out of the whole collection there was but one barrel anywhere approaching perfect straightness, the others deviating greatly from the straight line. The flint guns successfully held sway, until the invention of fulminates, and ignition by detonation to firearms, caused them to be somewhat reluctantly laid aside, and at the present time their use among civilised people is obsolete. The percussion system was successfully perfected in 1807 by the Reverend Alexander John Forsyth, LL.D., a Scotch clergyman, and for some fifty-two years minister of Belhelvie, Aberdeenshire. Between 1807 and 1825 numerous inventions were made relating to self-priming guns, sometimes the fulminate was enveloped in paper or metallic covers, and in other ideas the fulminate was simply rolled into small pills or pellets. In 1821 Westley Richards invented a percussion gun, which ignited with either the simple detonating powder, the paper caps, or the small pellets of fulminate. It was not until 1818 that the familiar copper cap was invented, but who first introduced the idea is not to be traced, almost every gunmaker of any note whatever claiming it as his own. From this time forward, we have one step to the gun in use at the present time, viz., the cartridge gun and rifle. Under the percussion era, if I may so term it, numerous types of guns and pistols were invented, the single and double barrel guns, rifles, revolvers,

and repeating firearms. The cartridge, however, seems to have given impetus and new ideas to the gunmaker, and enabled him to manufacture arms which it was impossible to do before; as, for instance, the magazine rifle, which is now used by all armies in some form or another, and in which five or more cartridges, held together in a metal clip, are loaded by one operation.

Cartridges were probably a French idea, the requisite quantity of powder and the bullet being wrapped up in paper to enable the soldiers to load quickly and dispense with the cumbrous powder-flask. The first mention of cartridges in England is in 1777, when a William Rawle patented several instruments for carrying soldiers' cartridges, which consisted of cartridge boxes having numerous divisions. The military cartridges were tied round at each end with string, the end that contained the powder had to be bitten off, the powder poured down the barrel, and the bullet and paper rammed down, the paper thus serving as a wad. It was this type of cartridge which fomented the Indian Mutiny, owing to a rumour being circulated amongst the Sepoys that the cartridge paper was intentionally greased with pigs' fat, causing the Sepoys in consequence to lose caste. Many and numerous are the patents and improvements in both cartridges and bullets, which, however, I must pass over as being outside the scope of the subject matter of this paper.

We have seen that hand-guns were first introduced into England in 1471, and I think it would be of interest if I gave you a list of the small-arms which have been in use in the British Army. They are as follows:—

Hand Cannon, 1471,
Arquebus, 1521,
Matchlock Muskets,
Flint Lock (Brown Bess),

many of which were afterwards converted to percussion muskets; Brunswick Rifle, Minie Rifle, Enfield Rifle, converted to the breech-loading Sniders, Martini-Henry, Lee-Metford, and Lee-Enfield, the two last named being repeating or magazine rifles.

It is a difficult matter to discover when guns were first made in Birmingham. There is reason to believe that one Hadley—whose name alone remains—produced the first gun made in Birmingham; but we have a distinct record that in 1689 the Birmingham manufacturers were able to undertake a Government contract for small-arms. Hutton, the Birmingham historian, tells us that William

III., at the suggestion of Sir Richard Newdegate (at that time one of the members for Warwickshire), employed certain manufacturers of the town to supply a quantity of arms for the Government service. The commission was satisfactorily executed, and from that day the gun trade has grown until it has become one of the most important industries of the town. It stands to reason, therefore, that the Birmingham gun trade must even then have been of considerable magnitude. Macaulay, in his "*History of England*," mentions that in 1685 the population of Birmingham was only 4000, and at that time nobody had heard of Birmingham guns. Prior to this date England obtained her supplies from abroad, most likely from Liege, the gunmakers of which city claim the honour of its being the most ancient seat of this manufacture. Liege has been celebrated as far back as the Crusades for the manufacture of armour, swords, axes, spears, lances, etc., so that it must be admitted that they have very substantial grounds for their claims. Most of the principal improvements in guns have emanated from Birmingham, and at the present time high-class guns made in this city enjoy a reputation second to none and command prices higher than can be obtained for London-made guns, many of which were never made in London, but have been proved in that city in order to satisfy the caprices of the customer who has the idea that Birmingham only turns out shoddy and cheap articles. Guns made in this city have been supplied to the Royal Families of Europe. Quite recently I had shown to me a most beautiful rifle which was intended for the present Czar of Russia. You can obtain almost any kind of gun you may require in Birmingham, and it may surprise you to learn that the African trade is also catered for by some firms. These guns are sent to the West Coast of Africa, where they are traded off for palm oil, rubber, and the like. They are known in the trade as Dutch guns, and are reported to be made from iron gas pipes. Certainly at 7s. 6d. each, and less for a quantity, you cannot expect to get Damascus barrels. The African taste is rather fickle in many things, but not so in guns, wherein, up to quite recently, they have rigidly adhered to the old flint musket with its bright barrel, which his father and grandfather used before him. There are various patterns in African guns, every district having its own particular taste. The barrels vary considerably in length, and the stocks, which are all made of beechwood, are carved in fantastic patterns, with glass eyes set in here and there, stained some brown, some black, red, and at times a bright vermillion.

When bullets are scarce they load all manner of metal articles into the barrel, one of the favourite doses being a few pieces of three leg (ends of the three iron legs of the cooking pots), which make a very nasty wound, as many of our soldiers can give evidence to. At Small Heath we have a factory which until quite recently was entirely devoted to the manufacture of army rifles. The origin of both the Birmingham Small-Arms Factory, as well as the Government Factories at Enfield and Birmingham, was directly due to the Birmingham gunmakers, who were anxious to maintain their position, and had long been aware of the manufacture of guns by machinery on the interchangeable system in America. The attention of the Government was called to the subject by a commission, of which Mr. Whitworth and Mr. George Wallis (Head Master of the Birmingham School of Art) were members, and in 1853 they visited the United States for the purpose of finding out as much as possible of the American system of gun-making. Their report had the effect of influencing the Government to establish a factory at Enfield, which was commenced in 1854 and turned out the first gun some four years later. During the year 1858 some 26,500 rifles were manufactured at Enfield. The Birmingham gun trade naturally regarded with some concern the establishment of a Government Factory on such a large scale, and after satisfying themselves of the success of the Enfield Works, took steps to secure for Birmingham a system which they saw would enable them to hold their position against the advance of Continental and other rivals. For this purpose a limited company was formed with the title of the Birmingham Small-Arms Co., with what success is known to the fortunate individuals who took up the shares. At the present time employment is given to some 2000 hands purely on rifle work, no sporting shot-guns being catered for. They can meet the requirements of the Government by supplying arms which will interchange with those made at Enfield or the two other Government Factories in Bagot Street and Montgomery Street, Birmingham. In the matter of cost, I should be inclined to think that the Birmingham Small-Arms Co. can produce cheaper than the Government. It was quite recently stated in the House of Commons that certain quantities of the new rifle had been put in hand at Enfield, and a large order given to the Birmingham Small-Arms Co. at £5 per rifle as against the cost at Enfield at £4 per rifle. By what means the Government arrived at their estimate of £4 a rifle is best known to the official mind.

If the same method of arriving at the cost price was adopted in a private concern, I am afraid an interview with the Official Receiver could not be long avoided. It was found upon enquiry that in getting out their cost price the Enfield officials had quite omitted to take into account such items as rent of buildings, interest on capital, salaries of many of the chief officials, and one or two other similar matters too insignificant for the official brain to trouble about. What the Enfield-produced rifle would cost if the same method of arriving at the price of production was pursued as is in vogue at Small Heath, no one can say. Every portion of the rifle is made at Small Heath, including the stampings. There are from six to seven hundred distinct parts in an army rifle, each of which has to pass the Government viewers, 100 of whom are stationed in the Birmingham Small-Arms Factory. All work is tested with fine gauges often up to a ten thousandth part of an inch. The Birmingham Small-Arms Factory can, if necessary, turn out 20 complete rifles per hour all ready for immediate use. More rifles were turned out last year at this factory than has ever been done at Enfield.

The manufacture of the Damascus gun barrels
Gun Barrels. is a distinct trade in itself. By this statement I wish it to be understood that the iron tubes from which the Damascus gun barrels are made come to the gunmakers direct from the barrel-makers. Of course, when they are received by the gunmaker they are in the rough, and considerable time and trouble has to be spent on them before they present the fine appearance shown in a finished gun. The manufacture of Damascus gun barrels—some years back an important industry in the district of Halesowen—has so diminished and deteriorated, that at the present time there are only two or three manufacturers in England, the supply of barrels being imported from Liege. Owing to the extreme difficulty in obtaining a pair of barrels absolutely free from defects, commonly known to engineers as greys or minute soft places, the Damascus barrel is being steadily shouldered out of the market by the steel barrel, which, if not so pleasing to the eye, is much more reliable and effective in the use. At the present time, it is estimated that some 30 per cent. only of the guns made have Damascus barrels, the remainder being steel, which in a good gun are drilled from a solid bar of steel, and in others drilled and rolled out by metal rollers, such as Smiths of Aston, from a steel bloom 9 inches long by 2½ inches

in diameter. Although the manufacture of a Damascus gun barrel is, as I have stated, a trade in itself, yet it plays such an important part in gunmaking that a short description of the method of manufacture may not be out of place, and perhaps be instructive to such of my readers as have the foreign business under their particular ken. The iron for the manufacture of sporting gun barrels was formerly made from finest scrap iron, such as old horse-shoes, nail stubs and the like. In preparing the metal for the old-fashioned laminated steel barrels, a number of scraps were collected of various proportions, the clippings of saws, steel pens, and scraps of best iron, which were placed for some time in a shaking barrel for cleansing, and then hand picked, in order that any pieces which had the appearance of cast iron might be removed. They were then cut into pieces of the same size, melted together, gathered into a bloom, and the mass placed under a tilt hammer, welded into a block of iron which was immediately rolled into bars. The bars were then cut into regular lengths, and the required quantity laid together and fastened into a faggot, this faggot was again heated in the furnace and hammered and rolled into rods of the size required by the barrel welders. The supply of fine old scrap does not now meet the demand, so at the present time the metal for gun barrels is made from a mixture of the best iron ores. The iron is made into rods, and subjected to hammering and rolling, which condenses the metal and increases the ductility and tenacity by elongating and densifying the fibres. The faggots are heated and welded seven times during the process of manufacture of the best barrel metal. The iron for the manufacture of gun barrels is made in square rods of various thicknesses for the best barrels, and in flat rods for plain twist or scelp barrels. To give the Damascus figure the square rods are first twisted, the operation being carefully overlooked to guard against one portion being twisted more rapidly than the other. This process is repeated until the rod is perfectly twisted and a regular figure in the barrel insured. It is this twisting of the rods that makes the difference between a best barrel and a common one. All Damascus barrels must be made of twisted rods. Plain twist or scelp barrels are made from plain straight rods or ribands. It is the twists in the rods that cause the figure to appear in the barrels and all iron so twisted is called "Damascus," from the town Damascus, where a similar process was first practised for the far-famed Damascus sword blades. The prepared rod is either

joined to other rods or coiled and welded into a barrel singly. Damascus barrels are made from one, two, or three twisted rods, and occasionally the Continental makers use four to six rods together. The Damascus barrels, as made in England, are usually manufactured from three twisted rods, which is quite sufficient to form a very fine figure in the barrel. Laminated steel barrels are twisted and the rods welded in the same manner as the Damascus, but the rods are composed of superior metal containing a larger percentage of steel. The rods having been twisted and the required number welded together, they are then rolled at a red heat into ribands. The ribands are then twisted into spiral form, again heated, and the coil well hammered until thoroughly welded. The proportionate amounts of the different descriptions of metal in a barrel determine its quality. Best English Damascus and modern laminated steel contain 60 per cent. of steel. The amount of steel is determined upon before making the metal into faggots for the last time. If for scelp barrels, the strips of iron are twice the thickness of the steel, the faggots being formed of alternate layers of iron and steel. In single iron Damascus barrels the proportion of iron is not much less than the steel, and although not passing through so many processes as the best barrels, is still far superior in quality to ordinary iron. In twisting the rods every care is taken to keep the edges of the iron and steel strips to the outside, for it is the twisting of the different metals that gives the various figures in the finished barrel. The steel being hard, resists the acids employed in the browning process and retains a white or light brown hue, whilst the iron, or softer metal, is so acted upon by the acid as to be changed into a dark brown or black colour. There is nothing in the process calling for any particular notice as far as fire risk is concerned. If in a suitable building there is no more risk than in a smithy, and in the whole course of my insurance experience I can only remember having one claim for a smithy being destroyed.

The first process in making a barrel from the
Drilling and solid bar is to drill a hole from end to end, the
Boring. hole thus made being reamerred—a pull-through operation. If necessary, the setter then straightens the bar, which is then turned on a lathe down to the required size, spotted or marked, as a guide to how far the grinder must work, and then handed over to him to grind on the stones. The boring operation may be divided into three classes—rough boring, fine

boring, and lapping or lead polishing. To "lead lap," or, to be more correct, "draw lap," the inside of a rifle barrel, it is first necessary to take a lead cast of the grooving or rifling, and this cast is then rapidly drawn backwards and forwards through the barrel until a fine surface is obtained. The position of the lead melting furnace should be considered when surveying. In all modern factories the boring is now done upon automatic machines, and as generally a high speed is required, perfect lubrication must be observed in order to keep the barrel cool. This is met with by an automatic oiling arrangement which is an integral part of the machine itself, and it will generally be found that there is a tank in the base of the machine holding some 30 to 40 gallons of lard oil, or lard, olive and paraffin mixed, which is automatically pumped up and poured directly on the cutting tool or bit. It is usually found that the floors in the immediate vicinity of these machines are saturated with oil, and care should be taken to see that some means are adopted to prevent the floors from becoming entirely permeated. If the machine or machines are standing upon brick, earthen, or concrete floors, so much the better from our point of view, but even then the floor should be kept in a clean condition and all waste and sawdust removed from the shop regularly. The addition of mineral oil to the lard and olive oil very materially reduces the liability of spontaneous ignition, but it is as well to be on the safe side and guard against such a contingency by having a clean shop. If the automatic machines stand upon a wooden floor, it is as well that the floor boards under and around same be covered with sheet lead. If this cannot be done, sand should be laid around the machine to absorb any oil which is thrown off by the rapidly revolving parts.

This is simply a process of barrel-grinding on
Grinding. grindstones, and involves no fire risk providing there is nothing of an inflammable nature in the grinding shed upon which the stream of sparks from the stones is likely to impinge. Considerable skill is required to turn out good work, a good grinder finishing his barrels in such a manner as will puzzle a gunmaker to say with any confidence whether they have been turned or ground. . For the benefit of my Accident friends I might mention that this branch of the trade is rather dangerous. The grindstones sometimes split into pieces, and when this happens the grinder rarely escapes without serious injury.

In the old days of gunmaking there was no reliable method of ascertaining when the barrels or straightening were straight, and as a consequence nearly all of them were crooked. This fact, as already pointed out, has been proved by the examination of collections of ancient firearms. The operation of setting or straightening adds in no way to the fire risk, and as an explanation of the methods employed would not assist us in any way, I will simply state that a barrel in the hands of a skilful setter can usually be made perfectly straight by a few taps of the hammer, the only tools required being a strong hammer and an anvil. The barrel passes through the setter's hands four times before it is allowed to be finally fitted up to the other parts of the gun.

On the return of the barrels from their provisional proof they are carefully overlooked, and if they require it are again sent to the setter to be straightened. Flats are then filed upon the inside of each tube at the breech end to cause the barrels to lie closer together. The steel lump is then dove-tailed in and brazed with brass for some three inches up the barrel from the breech ends. The space between the barrels is packed in at intervals with pieces of tin and brazed together; the ribs are then soft-soldered on.

This operation comprises the chambering of the barrel, cutting the recess for the extractor, planing the steel lump, drilling the lock holes, and sundry other technical operations which are performed on milling, drilling, and other metal working machinery of a like description. There is nothing calling for any particular notice in this department in the way of risk. The lubrication of all these machines is done with a mixture of soft soap and water.

These two processes are taken together, and I find it is customary for one man to take up a quantity of work at a certain price and employ other men under him to assist—a kind of “Butty-man” in fact. The work is non-hazardous and consists of the fitting of the breech actions, fore end lockwork, etc., to the barrels. Almost all the work is done with the file, and very careful and skilful workmanship is necessary to ensure perfect fitting. In this department you will observe the men using a small paraffin hand lamp for smoking or blackening the work in order that they can ascertain where the work requires

easing, it being of the utmost importance that all the joints shall fit tightly together and at the same time work smoothly. The use of the lamp, which is a very small affair without a glass, must not be allowed to alarm you. It is only lighted for a few moments and then blown out again. Of course, where a small gas jet is not handy we have the use of matches, to the careless throwing down of which so many fires are attributed.

Filing up. This operation describes itself, and need not occupy any of our time.

Furniture Filing. This also is a non-hazardous operation in which the trigger plates, guards, heel plates, etc., are hand filed.

Lock Filing. This is a non-hazardous process, but an operation requiring considerable skill, the great point being to file perfectly flat and square, which an amateur would find it well-nigh impossible to accomplish. The Birmingham gun filers are unexcelled in their skilful use of the file, and it is wonderful how they manage to turn out the beautiful shapes and accurate joints simply with the aid of a hand file; such proficiency has, however, not been attained before many years of practice. The parts forming a gun lock are forged from the best iron and steel, and the locks are generally bought in practically a finished state from Wolverhampton, Wednesbury, and Darlaston, these towns having for years past been famous for the splendid quality of their locks. A pair of really good locks will command as much as £5.

Gun Stocking and Fore-end Fitting. The woods used for the manufacture of gun and rifle stocks varies with the purpose for which the arm will be used and the price to be charged for same. Several woods have been tried and discarded, the only two woods now generally used being walnut and beech, the latter wood being used for the lower priced sporting guns and the African market, its liability to expand and shrink with changes of the atmosphere unfitting it for use in any but the commonest weapons. Walnut wood is entirely free from these objections, and is the ideal wood for gun and rifle stocks. Walnut stocks are, with a few exceptions, imported from Italy, France, and Germany. English walnut is very handsome, but is usually full of cracks which unfit it for use in good guns. The most beautifully-marked stocks are cut from the portion of the tree where the roots and trunk join; although

well-marked stocks are cut from the branches they have a tendency to warp. Good gun stocks must be light, handsome, straight in the grain, and "all heart"; free from shakes or cracks, close grained, and without galls or soft places. The value of a stock is greatly enhanced by a decided cross pattern or fiddle, such markings generally denoting great toughness. Really good stocks are difficult to obtain, and they will readily fetch a good price, especially if in couples of a corresponding pattern. The average price of a pair of very good stocks is about £3 10s., but as high as £5 a pair is occasionally paid. Stocks can be had from one shilling each to the prices I have just mentioned. The stocks must be perfectly dry before working. To guarantee that this is the case, the best makers keep them in stock for at least a year, and as the dealer has probably had them in hand for a year or so it is not difficult to see that they command a good price. The stocks, as supplied to the sporting gun and rifle makers, are rough shaped, so that a large amount of cutting away is not necessary. It is just as well to enquire, when inspecting a risk, the quantity of gun stocks usually held, and their value. To keep the stock in condition it is the custom to rub them down with linseed oil. Military gun stocks are generally cut up from the rough, and usually a large amount of wood-working machinery is employed. In the one factory employed on military work which I have in mind, and which you all know by name, if not by closer association—I refer to the Birmingham Small-Arms Co.—the stocking shop is quite a saw-mill on a small scale, and is very wisely isolated from the main portion of the works. The stocking shop at this factory must not, however, be taken as a guide as to what a similar shop in a sporting gunmaker's works is likely to be, where only perhaps two or three men are employed, and the shavings and refuse are practically nil. It must also be borne in mind that walnut is a very hard wood and not easily ignited, a point distinctly in our favour. The stocking in a sporting gun or rifle factory is all done by hand, and is usually done in three distinct operations. The rough stock is shaped to the specified order of the customer, and the openings for the screws and action let in, the fore-end is also treated and openings let in.

The stock and fore-end then goes to the
 Screwing and *screw* or *finisher* to have all the screw holes put
 Finishing. in, and then back to the stocker to have the lock-
 action work let in. Revolver grips or stocks are

usually bought ready-made, and are manufactured either from vulcanite or walnut.

The work of the percussioner is to file up and
Percussioning. fix the hammers or cocks from the roughly-shaped forgings or stampings. Formerly, in the days of the muzzle-loaders, this was a very important branch of the gun trade. The introduction of breech-loaders and hammerless guns has, however, greatly diminished the importance of the operation; in fact, with hammerless guns the percussioner has nothing to do. Hammer guns are now very rapidly going out of fashion. In really good rifles and guns they are put together in the white or unfinished state, taken to the shooting-range, shot and regulated according to the target made. They then go to be finished, and are afterwards again shot and adjusted until perfectly accurate.

This process is done on the usual polishing
Polishing. spindle running at a high speed, about 2000 to 2500 revolutions a minute, the object being to remove all traces of the file. The bobs are made of circular pieces of wood from 12 to 15 inches in diameter, having leather-covered edges which are painted over with the glue brush, and then passed through a box of emery dust. The position and general fixing of the glue kettle, the lubrication of the bearings, and the order and cleanliness of the shop are points to be borne in mind. Where electro-plating is done, as, for instance, in pistol work, you will find, in addition to emery polishing, a mopping bob, which is made of several pieces of calico fastened through the centre only, but which has the appearance of a solid wheel when running, owing to the high speed obtained. The mopping may be done with "crocus" or tripoli (a non-hazardous composition), or with Sheffield lime or whiting. The benches should be zinc-covered, and very great cleanliness observed, the liability of Sheffield lime to spontaneously ignite under favourable conditions being now fully recognised. No accumulations of used lime should be allowed, and all stocks of lime should be kept in a metal receptacle placed upon a stone flag—if in a room having a wooden floor—in a dry place. The very best work is polished by hand with the emery stick; this operation is known in the trade as lap polishing.

The beautiful engraving on the gun locks has
Engraving. all to be executed by hand, everything depending upon the skill and taste of the engraver. Some

of the guns I have seen for export have had very fine examples of the engraver's art upon them. Americans in particular like to have their guns well engraved, and not unfrequently order the ends of the barrels to be also engraved. The engraver is a very well-paid man, and good men are not easy to find. In one firm in Birmingham I found that the chief engraver was also a master at the Aston School of Art. From these remarks you will be able to judge that the value of a gun is greatly enhanced by the engraving upon it. There is no fire risk in the operating of engraving worth the mention. One of the most elaborate pieces of engraving I have ever seen on a gun is to be found in the Birmingham Museum. It is on a German-made gun manufactured in the early days of the 19th century, and depicts a view of Strasbourg Cathedral, a battle scene, and a hunt.

The parts of the gun or rifle which require to **Hardening** and be hardened and coloured are placed in a cast-
Colouring. iron pot and covered with animal charcoal. The pot is then placed in a muffle, in which it is allowed to remain at the discretion of the workman, according to the size of the part being operated upon; the part is then taken out and dipped into water, thus obtaining the blue-brown mottled appearance you will have noticed on the outside of the gun locks. This is very special work, and although the processes appear quite simple, it requires a long experience to obtain good results. Several Continental firms actually send their work to Birmingham to be hardened in order that the English colour shall be obtained, and so assist them to sell their goods as English made. We may rest assured that they would not do this if they could by any means obtain the same results themselves. One important Continental manufacturer came over specially to Birmingham to acquire the secret of the process, and in order to make no mistake took exact measurements of the muffles and vats and particulars of the operations, with which of course he was not altogether a stranger. On his return he set up a duplicate plant and naturally expected to obtain similar results as obtained in Birmingham, but he was doomed to disappointment, and has had to continue to send his work over to this city to be hardened and coloured. The fact is, that the men undertaking this work have had a life-long training and know exactly when to remove the gun part from the muffle, and how deep and what length of time it should be immersed in the water. Naturally they jealously

guard the knowledge they have acquired, and which means so much to them. I must say that it is a source of gratification to find one department of the gun trade upon which the foreigner is compelled to admit he is beaten. If the muffle or furnace is in the works proper, the surveyor should pay attention to the proximity of any timbers in the vicinity, especially the flooring over the muffle, which I have sometimes observed to be quite close. Many fires in this district have originated from this source.

All parts intended to be blued are burnished over after they are polished; this tends to close the grain of the iron, as well as giving a deeper colour and gloss to the article when blued. The blue colour seen on rifles and revolvers is obtained by heating the part to be blued in a pan of pounded ash charcoal. In case any of my friends wish to re-blue their rifles or revolvers, all they have to do is to place a pan or tray of ash charcoal over the oven or fire and bury the part to be blued in it. Remove the part occasionally and rub it down with a piece of tow and powdered chalk in order to remove any grease and secure a fine gloss. This process is frequently done by gunmakers on an iron plate heated underneath by fire or gas.

This process is one by which gun barrels obtain the familiar brown appearance observed in looking over a gunsmith's stock. The process, as far as we are concerned, is non-hazardous, providing the furnace in which the water is boiled is properly fixed and no large quantity of spirits of wine is kept in stock. The browning mixture is, roughly, composed of certain proportions of muriate tincture of steel, spirits of wine, muriate of mercury, nitric acid, and blue-stone, frequent applications of boiling water playing an important part in the process, which usually takes from four to six days for every barrel. Each gunmaker has his own recipe, and although the staining chemicals are well known, still some are better than others, and it is on record that some few years back a barrel browner made a fine income by visiting the various gunmakers and mixing their chemicals for them, the results being far more satisfactory than they could obtain from their own men. I know of two firms who have paid something like £200 each for the secret of this mixture, and which they jealously guard. At the present time, therefore, when surveyors are met with evasive

replies to their enquiries in the browning room, they will,—if they read these remarks,—understand that they are treading on delicate ground, and abstain from giving offence to proposers by unduly persisting in answers to their enquiries.

This can be regarded as the final operation a **Miscellaneous** gun goes through, and comprises the mounting of **Mounting.** the fore-end fasteners, fitting the sights, safety bolts, initial plates, nipples, anti-recoil heel plates, rifle eyes for the slings, etc., etc. The manufacture of rifle sights is a business in itself, and is seldom, if ever, undertaken by the gunmaker. Some of the sights now fitted on to up-to-date match rifles are very expensive and make a nasty hole in a ten pound note. In express rifles for big game, such as lions, tigers, etc., and also in elephant guns, you will find an anti-recoil heel plate consisting of a layer of pliable rubber affixed with screws to an ebonite plate. This is absolutely necessary in order to save the user from the kick, which is very punishing to the shooter if the gun is not properly held. I have been invited on several occasions to shoot an elephant gun, but so far I have not found nerve enough.

Quite 95 per cent. of the operations on the **Pistols and** manufacture of a modern pistol or revolver are **Revolvers.** all done by machinery, but there is the inside mechanism which requires, as in the case of guns, skilled hand labour. Revolvers intended for the Government are tested in some of their parts up to two-thousandths part of an inch, and in the Webley & Scott factory, who hold the Government appointment for this class of arms, a room is set apart for the use of the Government viewers, who, after gauging, stamp with a steel die a broad arrow on all parts of the revolver, the smallest spring not escaping their attention. When a revolver is passed out of the Government service another broad arrow is stamped alongside the one on the body, and you will always be safe in assuming that if you come across a revolver with only one broad arrow mark on same that it has been obtained in some dishonest manner. Of late the Continental manufacturers have turned their attention to automatic firearms or repeating rifles, in which the force of the recoil is employed to open the breech, eject the spent cartridge case, cock the firing mechanism, recharge with a fresh cartridge, and finally close the breech. Several rifles have been made on this principle, notably the Mannlicher,

Mausers, etc. Several automatic pistols are now sold which work on much the same system, such as the Mauser, Bergmann, Borchardt, Schwartzlose, Browning, Clement, Colt, Webley-Whiting, all of which, with the exception of the latter, being of a very small bore. So far, the British Government has not seen the need for adopting automatic rifles or revolvers, which they opine tends to extravagant use of ammunition. It is claimed for the Mauser automatic pistol that 6 shots can be fired per second, and 80 shots per minute.

It is usual with large firms to have a large Warehouse. stock of guns always on hand, and in the warehouse or showroom will be found examples of the work undertaken. From the operations explained to you, it will be evident that the stock could easily suffer to a large extent by a fire of moderate dimensions. First-class firms with a reputation for good work would doubtless refuse to have anything to do with a gun which had been partly damaged, but which might easily be put right and the damage made unnoticeable with little trouble. Regard should therefore be had to the amount of stock in the warehouse, and to the fact that same might be thrown on the hands of the insuring Office.

Most gunmakers keep a certain amount of Quantity of gunpowder in stock, and do their own filling for Gunpowder gun-testing purposes. The cartridge-filling is kept in Stock. always given to experienced men, and we seldom hear of any accidents arising from this operation. The quantity of gunpowder allowed to be stored is limited by law, but we seldom find that more than a few pounds is kept in the works. Stocks of cartridges are almost always kept ready packed in wooden cases, but here again any serious danger need not be apprehended—especially with what is termed the safety cartridge, which the railway companies carry without any extra charge—more particularly as fire insurance policies do not include the risk of explosion of gunpowder.

In this description of a gun works, I have had in my mind well-established firms occupying their own premises, but there are many gunmakers in Birmingham and elsewhere who purchase nearly all the parts, and only fit same and finish the gun. The parts usually purchased are, even with a large firm, as follows:—The tubes or bars of steel, locks, stampings, stocks, screws, forgings, heel-plates, sights, and other ornaments. A

large amount of work for both large and small firms is given out to the workman, which he takes to his home, where he is assisted very often by the adult members of his family. Anyone passing through the gunmaking portion of this city can hardly have failed at times to have noticed boys carrying portions of gun parts over their shoulder, evidently either returning the finished work or taking some new work home to be attended to.

Considered from our point of view, a gun factory is very much the same as an engineering works on a small scale, with the difference, however, that more of the operations require hand work only. Gunmaking is carried on in this city under all kinds of conditions, some of the buildings being of a good age and others quite modern. No hard and fast rule can be laid down for the acceptance or otherwise of the class of risk, which will have to be considered from all standpoints by the surveyor when making his inspection. As a class of risk, I should say the gun trade has paid the Offices very well.

In the year 1637, in consequence of the prevalence of the bursting of inferior guns, the Company of Gunmakers of the City of London instituted a proof-house at which the barrels of respectable makers were all sent to be proved. A Royal Charter was granted, "with power to search for and prove and mark all manner of arms, great and small, daggs and pistols, and every part thereof made in London or the suburbs, or within ten miles thereof, or imported from foreign parts."

In Birmingham a Company was formed in 1813, an Act of Parliament obtained, and suitable premises for the proof of gun barrels taken. The 1813 Act was, however, found insufficient, owing to many makers finding means to evade it; and in 1855 another Act was obtained in which it was enacted that any person or persons selling any guns, the barrels of which had not been proofed at either London or Birmingham, were to be liable to a fine of £20. Also, any person forging the proof marks of either proof-house were to be liable to the same fine, in default of the payment of which they were to be imprisoned. Certain rules and regulations were laid down, which were precisely the same for both London and Birmingham proof.

A description of the *modus operandi* in the proof of gun barrels may be interesting. The system employed is the same at both the London and Birmingham proof-houses. The tubes or barrels

are sent in to the proof-house with a metal plug in which is a touch-hole screwed into one end ; this plug is known in the trade as a hut. Each barrel passes through the proof-house with a number attached to it, so that the name of the owner or maker is unknown to the workmen, who therefore have no opportunity, if they so wished, of wilfully spoiling or tampering with the barrel. Before the barrel is sent to the loading-room it is gauged by plugs and stamped with a number. The workman whose duty it is to stamp the barrels stands at a bench, upon which fifty or sixty numbered steel punches are arranged in order. Corresponding to these are numbered gauging-plugs, varying in size from that of a pea to two inches. Having ascertained the exact bore of the barrel by means of one of these plugs, he takes up a punch bearing a similar number to the plug and stamps the number on the barrel. The man whose duty it is to load the barrel, seeing the number, is able to judge the proper amount of loading to put in it. Leaving this room and following a short tramway along which the barrels are conveyed, we come to the loading-room. Here everything is done by rule and measure, every precaution taken to ensure safety, and every means used to prevent fraud. The room is divided into three compartments separated by strong brick walls, so that should an explosion occur in either the injury would be confined to the division in which it took place. The floors of the room, which are of brick, are always kept damp and cleanly. In the first compartment the barrels are loaded by one man, who has the barrels arranged round the room. In front of him is a rack of copper measures, and numbered from 1 to about 50. Upon ascertaining the number stamped upon the barrel, he takes up one of the measures bearing a corresponding number, and having filled it with gunpowder places the charge in the barrel ; he next takes a proper-sized cork wad and a leaden plug from a numbered box corresponding with the bores, and afterwards a second cork wad with which he loads the barrel. The barrels are passed into the next compartment, where the charge is rammed home with copper rods prepared for the purpose. The barrel is then passed into the third compartment, where it is primed and then transported into the firing-room. The firing-room is a large lofty building, lined throughout with sheet-iron, and has ventilators in the roof ; the windows are openings capable of being immediately closed with iron shutters arranged upon the same principle as a Venetian blind. The barrels are arranged upon a

grooved rack, and fired by a train of gunpowder which connects the breech vents with each other. The train is fired by a percussion cap, which is detonated by a hammer working on a pivot and pulled from the outside; the iron door and shutters are opened to allow the smoke to clear away, and the barrels are then seen to be partially buried in a sand-heap which is behind the rack, the bullets being shot into the sand-heap on the other side of the room. The barrels are then collected, and those which from any cause have missed fire are again placed on the rack; the others are conveyed to the inspecting-rooms, where they are washed out, inspected, and, if found perfect, marked according to the Proof Act. The barrels, however, have previously to stand the hot-water test, which consists in plugging the muzzle with a lead stopper, filling the barrel with boiling water, stopping the breech with a similar plug and striking it with a hammer, so that the water, being compressed, exerts an internal pressure upon the barrels, and if there be any flaw or minute hole it will force its way through. Common barrels have to stand twenty-four hours before being cleaned or looked over, so that if any flaws are in the barrels the action from the acid residue from the powder will eat into them and make them more apparent. The aforementioned description is termed "Provisional Proofing," and is done when the barrels or tubes are in their filed state. The second or "Definite Proof" is done when the gun barrels are fastened together, and have the breech-actions attached, and made up in what is known in the trade as the "white" state. Another, or third, proof takes place for guns marked for nitro powders. Each barrel is fired separately. The guns when loaded are taken to the lobby of the firing-room, and one gun is taken into the room and proved at a time. The barrels and breech-actions are fixed on and fastened to a travelling block of the required shape, and fired by means of hammers dropping upon the striker, which strikes the cap in the cartridge. The hammer is pulled by a cord passing through a hole in the wall. Should any flaws or defects be discovered the barrels are returned to the maker, who remedies the defects as best he can and again submits them for proof. Best barrels seldom burst at proof, but they are more often bulged, in which case the bulges are knocked down by the maker and the barrel reproofed until it either bursts or stands proof. In the definite proof the weak breech-actions are frequently blown to pieces or else made to gape at breech, in which case the maker

hammers the false breech till close and case-hardens it, and when again proved it generally stands. The proving of breech-actions is very necessary, as it prevents in a great measure dangerous common breech-actions being sold. In the United States, France, Germany, and Holland, no proof-houses exist; and it is only in London, Birmingham, and Liege that barrels are compelled to be proofed by Act of Parliament. All small-arms bearing the Belgian proof-mark may be sold in England without being reproofed, providing they do not bear the name of an English maker. The Gun-barrel Proof Act does not extend to Ireland or the Colonies. Many gun barrels and breech-actions made in Birmingham go to London in order that they shall bear the London proof mark. If the provisional proof is done in London the Birmingham authorities will not grant their mark for the definite proof, and *vice versa*. The proof only applies to firearms intended for the public use; the Government do all their own proofing for both rifles and revolvers.

I cannot leave my subject without saying **Fiscal Question.** a few words on the principal topic of present political and commercial life. I mean the Right Hon. Joseph Chamberlain's Fiscal Policy, in so far as it concerns the gun and small-arms industry. For some time past the London and Birmingham proof-house authorities have been aware that foreign-made barrels and breech-actions have been sent to them to proof simply to obtain the coveted marks, which have a distinct commercial value the whole world over. Last year some 80,000 foreign barrels were submitted for English proof. Not a pennyworth of English labour had been spent on the productions, and yet the foreign maker can sell his manufactures both here and abroad as English-made guns. Needless to say there are those who are induced to believe that the London and Birmingham proof-mark means that the arm is of English manufacture, and, as a consequence, any amount of dishonesty prevails. The Damascus barrel-making industry, as explained, has declined in England, and, as a consequence, the gunmaker has had to go to Belgium for his supply. This in itself is legitimate enough; but some traders, less scrupulous, have imported actions in one case and barrels in another, obtained the proof-mark, and passed them off as English manufacture. Steel barrels have now to a large extent taken the place of Damascus barrels, and we are practically independent of Belgium for the

supply of barrels. Why, then, should we grant to America, Belgium, France, Germany, &c., the advantages of a valuable proof-mark which enables them to oust genuine English-made guns from the home and colonial markets? We may rest assured that they would not send their guns to us to be proofed unless they recognised the fact that a better price could be obtained for a gun London or Birmingham proof-marked. The proof-house authorities have the matter at present under their serious consideration, and fully realise that this state of things wants remedying. They propose, I believe, to raise their charges for proofing foreign-made guns; but as the foreigners can produce much cheaper abroad, the remedy is hardly likely to be effective unless the charges are made prohibitive. Personally, I should like to see the Act so altered that all foreign guns should be marked with the place of origin, and English proof-marks reserved for British-made firearms, which would have the effect of protecting the home market and give a substantial preference to our own manufacturers.

A FEW REMARKS UPON THE ARBITRATION CLAUSE.

By J. SCOTT CAVELL,
Norwich Insurance Institute.

IN the early days of Fire Insurance, and indeed until the reign of William IV., it was held by the judges that an agreement inserted in a policy to settle points of dispute by arbitration was null and void, as no compact entered into by persons, *inter se*, could oust the jurisdiction of the law courts. By degrees, however, the judges modified their views on the ground that such ruling was "directly contrary to the spirit of later times, which leaves parties at full liberty to refer their disputes at pleasure to public or private tribunals." (Coleridge.) It was held that the agreement of the parties interested might make it a condition precedent to the right to bring an action; that any matter of controversy, other than a principle of law, be referred to arbitrators; and that, when such condition appeared upon a policy, and the insured commenced an action at law, rejecting arbitration, the insurer was entitled to have the action struck out on application to the judge. (*Hodgson v. Railway Passengers Accident Co.*)

"The Arbitration Act, 1889" (52 & 53 Vict.), clearly defines the extent and limitations of arbitrations, Cap. 49 reading as follows:—"If any party to a submission, or any person claiming through or under him, commences any legal proceeding in any court against any other party to the submission, or any person claiming through or under him in respect of any matter agreed to be referred, any party to such legal proceedings may at any time after appearance, and before delivering any pleadings, or taking any other step in the proceedings, apply to that court to stay the proceedings, and that court or a judge thereof, if satisfied that there is no sufficient reason why the matter should

"not be referred in accordance with the submission, and that the applicant was at the time when the proceedings were commenced and still remains ready and willing to do all things necessary to the proper conduct of the arbitration, may make an order staying the proceedings." A "submission" is defined as a "written agreement to refer present or future differences to arbitration." Although the Arbitration Clause is a *printed*, not a *written*, agreement, it is recognised as coming within the meaning of the Act. (*Baker v. Yorkshire, &c., Co., 1892.*)

In a recent important case (*Davies v. Alliance Insurance Co.*) the Court of Appeal (Supreme Court of Judicature) decided that the clause required *all* questions to be referred, even though fraud were alleged, that is to say that until arbitration has taken place, and the liability of the Company has been ascertained by the award of the arbiter or arbiters as a condition precedent, no action can be brought.

A usual Arbitration Clause reads as follows:—

Wording of "If any difference shall at any time arise between the Clause. "the Company and the insured or any claimant "under this policy as to the amount of any loss or "damage by fire, or as to the fulfilment or non-fulfilment of any "of the conditions herein set forth, or as to any question, matter "or thing concerning or arising out of this insurance, every such "difference, as and when the same arises, shall be referred to the "arbitration and decision of two arbitrators, one to be chosen by "the party claiming and the other by the Company, or, in case of "disagreement between them, then of an umpire to be chosen by "the arbitrators before entering on the reference, and the cost of "the reference shall be in the discretion of the arbitrators or "umpire, as the case may be, who shall award by whom and in "what manner the same shall be paid, and the decision of the "arbitrators or umpire, as the case may be, shall be final and "binding on all parties, and this condition shall be deemed and "taken to be an agreement to refer as aforesaid, the submission "to arbitration being subject to the provisions of 'The Arbitration "Act, 1889,' or any statutory modification thereof."

The clause as worded above is not suitable for Scotland or Ireland, as it refers to an Act which applies only to England. It is also sometimes varied so as to include all matters, even fraud, and the costs of the reference are not always left to the discretion of the arbitrators or umpire, but it is occasionally stipulated that

each party shall pay his own costs of the reference, and a moiety of the costs of the award and of the arbitrators and umpire.

The most recent form seen by the writer, as framed by eminent counsel and adopted by some of the leading Offices, is applicable to the United Kingdom of Great Britain and Ireland, and reads as follows:—"All differences as to the liability and the amount of the liability of the Society in respect of any claim for loss or damage or otherwise arising out of this policy shall be referred to the decision of an arbitrator to be appointed in writing by the parties in difference, or, if they cannot agree upon a single arbitrator, to the decision of two arbitrators, one to be appointed by each of the parties in writing, or in case of disagreement of the arbitrators, of an umpire to be appointed by the arbiters in writing before entering upon the reference. The costs of the reference (but only as between party and party) and of the award shall be in the discretion of the arbitrator, arbitrators, or umpire making the award, and the obtaining of the award shall be a condition precedent to any liability of the Society or any right of action against the Society in respect of any claim. And after the expiration of one year after any loss or damage the Society shall not be liable in respect of any claim therefor unless such claim shall in the meantime have been referred to arbitration."

It is certainly difficult to understand objections to this clause. A man insures his property with a Fire Company. A fire occurs and a claim is sent in.

The loss assessor, having inspected the damage and made due enquiries, is, we will suppose, of opinion that the amount claimed is excessive. He therefore makes an offer of a certain sum in full settlement of the loss, which offer the assured declines to accept. In such circumstances the next step is to submit the differences to arbitration. Two suitable persons are nominated, one by the claimant and the other by the Company, and these two mutually agree upon an umpire, to whom the case shall be referred in the event of their being unable to agree to the amount of an award.

It seems impossible to imagine any fairer arrangement than this, or one more calculated to facilitate settlement and avoid unnecessary expense. The assured selects his own arbiter, and if he, after careful consideration of the facts, practically agrees with

the Insurer's nominee, the claimant, if still dissatisfied, must be considered as being in the wrong.

It may be noted that in every article the writer has seen attacking this clause the fact has been omitted that the policyholder possesses, as here shown, precisely the same right of nomination as the Company, and this fact disposes of the suggestion that the arbitrators are subject to the influence of the Insurance Companies.

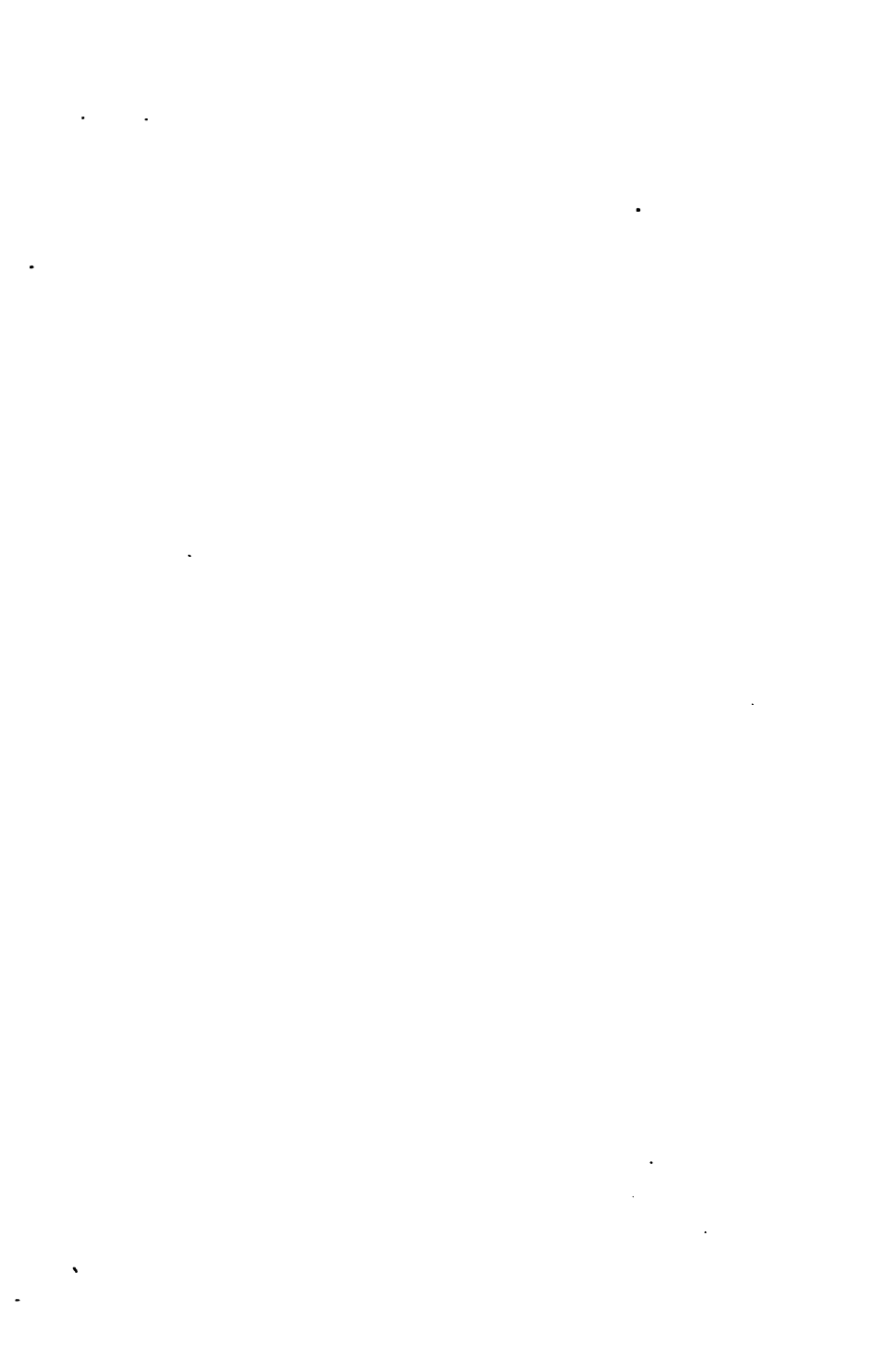
If those who argue against the clause had their way, and recourse to the law courts were necessary to settle every claim when the parties disagreed, the delay and expense would obviously be greater than under the present system of arbitrations, so that the assured would be the losers by the change. It must be remembered that the public in the long run pay, in the form of premiums, all the losses settled by all the Companies, and if the expenses in connection with agreeing to the amount of claims were to be seriously increased, the rates for all classes of Fire Insurance would necessarily be proportionately advanced.

It is most erroneously assumed by some that the method pursued by loss assessors is to offer the claimant an absurdly small sum in full payment of a loss and, in the event of his demurring to accept an amount which will not indemnify him, to proceed to threaten him with resort to arbitration, whereupon the unhappy man, choosing of two evils the lesser, takes what he can get lest a worse thing befall. If such were the procedure there would be thousands of persons writing to the papers, holding indignation meetings, and petitioning Parliament, and so shady a method of doing business could not endure for a year. As a matter of fact, however, arbitrations and suggested arbitrations form an almost negligible percentage of the losses paid by all the Offices in any one year, and where this mode of settlement is resorted to it is owing generally to one of two causes—either the claimant takes an inflated view of the value of his property or else there is a perfectly justifiable difference of opinion between the assessor and the assured which can be promptly settled to the satisfaction of both by independent practical arbitrators (or an arbitrator) without resorting to the expensive machinery of the law courts.

It is a matter of common knowledge that Insurance Companies make numerous payments to policy-holders for which there is no

legal liability, and though they doubtless find it in their interest to do so, the public neither expect nor receive such treatment in other business transactions as a matter of ordinary practice.

It is interesting to note that the principle of
Concluding referring disputes to arbitration is rapidly growing
Remarks. in commercial matters other than insurance. The
costly and protracted procedure of the law courts
("the law's delays," mentioned by Hamlet as among the "ills that
flesh is heir to") is avoided as far as possible, a simple, speedy,
and inexpensive method of adjustment being preferred. To look
higher, the Hague Convention to substitute arbitration for war,
and other epoch-making efforts in the same direction, surely prove
that arbitration (the modern reading of "agree with thine
adversary quickly") so far from being archaic is the spirit of
modern times.



A LIFE OFFICE PROSPECTUS.

By JAMES STIRLING, F.F.A.

*A Paper read before the Insurance and Actuarial Society of
Glasgow, November 16, 1903.*

IN considering a subject on which to address you, I have endeavoured to select one likely to be of interest to the Society as a whole, but particularly to those members of it whose office duties do not appear to them to necessitate a knowledge of matters actuarial. There is no doubt in my mind that every member of the staff, and certainly every responsible officer of a Life Office, ought to have a working knowledge of the science on which his business is founded. Without this knowledge it is impossible to have the same interest in our everyday work, or that the work itself can be so intelligently and therefore so efficiently carried out.

Every Actuary who has experience of furnishing extra rates or making special quotations to Branch Offices and Inspectors must often have felt that a little actuarial knowledge on the part of the enquirer would simplify matters, even if only to the extent of preventing him from asking what is practically a new table of rates by wire or by first post. Enquiries of this kind are always received at Head Office on a Saturday. It would also prevent an Inspector promising an Agent the usual £1 per cent. Commission, and a proposer a 30s. Bonus on a Child's Endowment. In circumstances like these it has frequently occurred to me that a short non-actuarial description of the principal tables that go to make up the Prospectus might be of some assistance to members of the outdoor staff.

It was also my intention to make a comparison between the Prospectus of the present day and that of 100 years ago, but this I found somewhat difficult to do in the manner contemplated owing to the difficulty of obtaining the information required.

The subject "A Life Office Prospectus" really touches on everything relating to the business of Life Assurance.

The principal items in the Prospectus, apart from rates, are security, bonuses, free limits, world-wide policies, non-forfeitable policies, surrender values and free policies, policy loans, valuation basis, settlement policies, payment of claims, assignments.

These introduce the subjects of investments, actuarial science and law, and if the doctor is not directly introduced, he comes in, even in non-medical cases, when a policy becomes a claim.

I do not propose to touch on all these subjects, but only to refer very generally to some of them.

The table which is usually found at the end of the Prospectus is a table of Annuity Rates. This is probably the oldest form of Life contingency, and practically all our Life rates are derived from annuities, and a glance at their history, therefore, may not be uninteresting.

During the first century before Christ—in 40 B.C. to be exact—there was enacted in the Roman Empire the Falcidian Law—*Lex Falcidia de Legatio*—which secured at least a fourth of a testator's estate to his heirs at his death by enacting that a man could not give legacies for more than three-fourths of his estate. This made it necessary to *value* in some fashion such legacies as consisted of life annuities. The method of valuation in common use in 230 A.D. was, up to age 30, to take 30 years' purchase, and over age 30 to take the difference between the annuitant's age and 60.

The table of Domitius Ulpianus, the celebrated Roman jurist, is, according to Walford, the first known measure of Life annuity values graduated with reference to age.

He appears, however, to have overlooked the fact that the scale of values just referred to is graduated after age 30, and was probably in use before that of Ulpianus.

This table of Ulpianus was adopted not 100 years ago by the Tuscan Government for the valuation of annuities!

In 1282 King Alexander III. of Scotland, on the marriage of his daughter Margaret to Eric, King of Norway, gave her a marriage portion of 14,000 marks, reserving the right to give an annuity of 700 marks for half the amount. This gives ten years' purchase as the value of the annuity, but whether this was an arbitrary sum or according to scale it is impossible to say. Margaret died within a year. Whether King Alexander had exercised his option or not I have been unable to ascertain, but the existence of the option shows that the Scot was "canny" even in the 13th century.

- In the 16th century there was a considerable business done in the sale of Life annuities, persons lending money evidently taking this method of getting round the usury laws.

Dr. Thomas Wilson, in "A Discourse upon Usurie" published in 1554, says:—"A corporation taketh £100 of a man to give him 8 in the £100 during his life without restitution of the principall. It is no usurie, for that here is no lending but a sale for ever of so much rent for so much monie. Likewise it is if a private man hath a thousand pound lieing by him and demandeth for his life and his wife's life a £100 by the yere and never to demand the principall. It is a bargain and sale and no usurie, for that the principall is not to be restored again at anie time and therefore no lending can be presupposed."

Dr. Wilson was clearly demonstrating that the sale of a Life annuity was not a loan transaction, in order to show that the usury laws did not touch it.

In 1692, by what is known as the "Million Act," the British Government endeavoured to raise money by means of Life annuities. The object was to raise one million sterling by means of tontine annuities "to carry on the war against France." The intention was to divide annually among the subscribers or the survivors of them £100,000, 10 per cent. per annum on the £1,000,000 raised, until the year 1700, and thereafter to divide £70,000 annually—7 per cent. There was no restriction as to age, but in spite of that all that could be raised was £881,493.

Dr. Halley, the astronomer, in 1693 read a paper before the Royal Society, entitled "An estimate of the degrees of mortality of mankind drawn from curious tables of the births and funerals at the City of Breslau, with an attempt to ascertain the price of annuities upon lives."

The paper is interesting as containing the first Mortality Table based on actual data scientifically arranged. In it he showed how the values of annuities and assurances on lives might be found by means of a Mortality Table.

The uses to which Dr. Halley considered the Table might be applied are as follows:—

"The first use hereof is to show the proportion of men able to bear arms in any multitude, which are those between 18 and 56 years.

"The second use of this Table is to show the differing degrees of mortality or rather vitality in all ages.

"Use III.—If it be inquired of what number of years it is an even lay that a person of any age will die this Table readily performs it, for if the number of persons living of the age proposed be halved it will be found by the Table at what year the said number is reduced to half by mortality, and that is the age to which it is an even wager that a person of the age proposed shall arrive before he die—as for instance a person of 30 years of age is proposed, the number of that age is 531, the half thereof is 265, which number I find to be between 57 and 58 years, so that a man of 30 years may reasonably expect to live between 27 and 28 years.

"Use IV.—By what has been said, the price of insurances upon lives ought to be regulated; and the difference is discovered between the price of insuring the life of a man of 20 and 50. For example, it being 100 to 1 that a man of 20 dies not in a year, and but 38 to 1 for a man of 50 years of age, and so on."

Not to carry the history of the subject further, we have Mortality Tables based on the experience of assured lives which are for that reason the best adapted for insurance purposes. These show the probability of dying within a year at every age up to the limit of life. If a person aged say 40 desires to insure his life for £1, payable should he die within twelve months, we find from our Mortality Table that the probability he will die in that time, q_{40} , is .00915, and if money earned no interest the premium for the risk would be .915 per cent. The premium is payable at the beginning of the year and will earn interest if invested, and we must therefore discount this sum. Assuming 3 per cent. interest, and multiplying the probability already obtained by the present value of £1 due at the end of a year $.00915 \times .971$, we get .00889 as the net premium for an assurance of £1 payable if a person aged 40 die within 12 months. When the assurance is payable at death, whenever it may happen, we proceed as above for the first year, and in a similar manner find what sum must be paid now for the risk of death between the ages of 41 and 42, 42 and 43, 43 and 44, and so on year after year to the end of life as shown by the Mortality Table we are using. The summation of the first ten or fifteen values is the single premium for an assurance payable at death within ten or fifteen years, and the summation of them all right on to the end

of life is the single premium for an assurance at death whenever it may happen.

If for the probability of *dying* we substitute the probability of *living* through each year, we shall get the present value of 1 payable at the end of each year a person aged 40 *survives*, in other words the value of an annuity at age 40.

The summation of the first ten or fifteen values will be the value of an annuity for ten or fifteen years, and the total of all the values the price of an annuity for life.

Having seen how to get a single premium for an assurance payable at death and how to find the present value of an annuity, we can from these construct practically all the Tables of the prospectus. Table I. is always a table of annual premiums for assurance payable at death. To find the annual premium is a question of proportion. Instead of paying a sum down for the assurance, the proposer says, I will pay you so much yearly, *i.e.*, an annuity. Denoting the single premium at age 40 by the symbol A_{40} , and the present value of an annuity of 1 at age 40 by a_{40} , the amount of annuity which the single premium will purchase is $\frac{A_{40}}{a_{40}}$, and this is the annual premium.

By varying the duration of the annuity we vary the number of years' payments to be made in lieu of a single payment. If we divide the single premium by an annuity for 5, 10, 15, or 20 years, we get the annual premium for an assurance payable at death, the premiums limited to 5, 10, 15, or 20 annual payments.

To ascertain the annual premium for a short period assurance we must divide the single premium for the risk by an annuity for the same number of years as the assurance is to run. If we divide by an annuity for a longer period we are reckoning on receiving premiums after our liability to pay the sum assured has expired. The assured having nothing to get will cease paying the premium and we shall not have been paid for the risk.

An endowment assurance payable at the end of a certain number of years or at earlier death is made up of two parts—as assurance payable only in the event of death within the period, and a pure endowment payable only in event of survivance to the end of the period. The premium for the term assurance added to the premium for the pure endowment makes up the endowment assurance premium. If we make the endowment premium pro-

vide double the amount provided by the term assurance premium so that the combined premium provides £100 at death or £200 on survivance, the policy is called a Double Endowment. The proportions of the endowment and the assurance to one another may be varied indefinitely.

With the object of showing exactly what an Endowment Assurance consists of, I have calculated values for periods of 10, 15, and 20 years at ages 20, 30, 40, and 50.

OM. $3\frac{1}{2}\%$.

NET ANNUAL PREMIUMS.

Age.	10 YEARS.				15 YEARS.				20 YEARS.			
	Pure Endowment	Term Assurance.	Endowment Assurance.	Double Endowment	Pure Endowment	Term Assurance.	Endowment Assurance.	Double Endowment	Pure Endowment	Term Assurance.	Endowment Assurance.	Double Endowment
(1)	(2)	(3)	(4)	(5)	(2)	(3)	(4)	(5)	(2)	(3)	(4)	(5)
20	8·227	·459	8·686	16·913	4·965	·506	5·471	10·436	3·342	·557	3·899	7·241
30	8·009	·697	8·796	16·895	4·831	·772	5·603	10·434	3·196	·857	4·053	7·249
40	7·888	1·092	8·980	16·968	4·589	1·238	5·827	10·416	2·911	1·415	4·326	7·237
50	7·437	1·917	9·354	16·791	4·064	2·245	6·309	10·373	2·315	2·616	4·931	7·246

The Table explains itself.

The terms for which the policies are to run are at the top, and the ages at entry in the margin.

If you look down the columns of Endowment Premiums you will observe that the premium diminishes as the age increases.

This is what one expects, for the probability that a man of 50 will survive ten years is much less than the probability of a man of 30 surviving the same period. Similarly, as the probability that a man of 30 will die within ten years is not so great as the probability that a man of 50 will die within that time, the man of 30 pays less for a ten years' insurance than the man of 50. These are the two elements that make up an Endowment Assurance premium, and as the age at entry operates on each in an opposite direction, the premiums for Endowment Assurances maturing in the same number of years differ less than whole term premiums.

With the Endowment Assurance split up into its component parts as we have it in the Table, it is obvious that these parts may

be combined in any proportions we please. One of the most useful combinations is the Double Endowment. By adding to the Endowment Assurance premium the premium for another endowment we obtain a premium which provides £100 at death within the period selected, or £200 on survivance. The first thing that strikes one in looking down the columns of Double Endowment premiums is that they diminish as the age at entry is increased. This at once suggests that the Table is peculiarly suitable for impaired lives, which are assurable, but only at an extra rate.

It is usual in publishing a table of this kind to make the premiums uniform for all ages at entry. One Company, which advertised the scheme extensively, printed premium rates which decreased as the age at entry increased. To be quite consistent, the Company ought to have given the impaired lives the benefit of their physical inferiority by rating them up.

Under this Table lives with a bad family or personal history, if assurable at all, may be taken at normal rates. The Table automatically rates up the damaged life.

Suppose a man of 20 who has a record which renders him assurable only at the rate of premium payable at age 50 proposes for a twenty years Double Endowment policy. The premium at his real age is 7.241, and for his rated-up age 7.246. The premiums are the same and there is no rating up, you say; the 30 years addition to the age has made no difference. But look at the Table and you will see the effect of the rating up. A man of 50 is less likely to live twenty years than a man of 20, and the rating up has therefore reduced the Endowment premium from 6.684 to 4.630. Similarly because a man of 50 is more likely to die within 20 years than a man 30 years younger, the rating up has increased the assurance premium from .557 to 2.616.

Since then a rating up of 30 years in the age makes no difference in the premium, it is evident that under this Table medical examination may, within limits, be dispensed with.

In practice it is not necessary in making up rates to take each year of life separately as described above. The facilities afforded by tables already calculated renders this unnecessary. But when the principles which underlie the calculation are borne in mind one can easily see how an infinite variety of kinds of assurance and methods of paying premiums may be adopted.

By way of illustration :—

The single premium for an assurance payable at the death of a person aged x is

$$(1) {}^*A_x = \frac{v d_x}{l_x} + \frac{v^2 d_{x+1}}{l_x} + \frac{v^3 d_{x+2}}{l_x} + \dots$$

The present value of an annuity payable during the life of a person aged x is

$$(2) a_x = \frac{v l_{x+1}}{l_x} + \frac{v^2 l_{x+2}}{l_x} + \frac{v^3 l_{x+3}}{l_x} + \dots$$

In the first expression we have the single premium for an assurance payable at death whenever that may happen. By summing a particular number of the terms of the series we obtain the single premium for an assurance payable at death, only if it happened in the particular period. We have excluded the remainder of life.

If instead of omitting some of the terms at the end of the series we omit some of the terms at the beginning, the summation of the remainder will give us the single premium for a deferred assurance, an assurance payable only in the event of death after a certain number of years.

If we multiply the 1st, 2nd, 3rd, and so on terms of the series on the right hand side of equation (1) by 1, 2, 3, so that the series becomes

$$v \frac{d_x}{l_x} + \frac{2 v^2 d_{x+1}}{l_x} + \frac{3 v^3 d_{x+2}}{l_x} + \dots$$

we get the single premium for an increasing assurance of 1, £1 payable in the event of death in the first year, £2 in the event of death in the second year, £3 in the third year and so on. By adding this to the premium for an assurance of £100 we have the premium for an assurance of £100 with what may be called a guaranteed bonus of 1 per cent. per annum.

The increasing assurance may be made of any amount and a guaranteed bonus of any amount provided. In reality, of course, the policy is an increasing assurance without profits and it will be placed among the non-profit business.

* v is the present value of £1 due a year hence ; v^2 is the present value of £1 two years hence ; v^3 is the present value of £1 three years hence ; d_x the number of persons who die between age x and $x+1$; l_x the number of persons alive at age x ,

We may readily estimate by means of a table of this kind whether the profit or non-profit table of any office is the more favourable for a particular age.

ANNUAL PREMIUM (NET) FOR AN INCREASING ASSURANCE OF 1.

20,	.	.	.	·400
25,	.	.	.	·434
30,	.	.	.	·469
35,	.	.	.	·506
40,	.	.	.	·546
45,	.	.	.	·586
50,	.	.	.	·628

For example, I find an Office in which at age 20 the profit premium for £100 will provide a non-profit policy for £134. The Office pays a 28s. bonus, and it will take about twenty-five years before the bonus amounts to £34. During quarter of a century, therefore, the non-profit policy is much the better investment. I find further that the difference between the profit and the non-profit premiums is sufficient to provide an increasing assurance of 30s. per annum, so that that particular Office might at age 20 guarantee a 30s. bonus as it is actually receiving the premium for it.

Instead of varying the sum assured we may operate on the annuity and so vary the method of paying the premium. If to the whole Life annuity we add another payable only for five years, and divide the single premium by this new annuity, we shall get an annual premium which is reduced by a half after five years. Again, if we divide the single premium by an annuity which consists of a whole Life annuity and an annuity deferred five years we shall get a premium which is doubled after five years or, to express it differently, half premium first five years. By taking every fifth term of the annuity value we obtain an annuity payable at the end of every five years, and dividing the single premium by this annuity we get a premium which is payable every five years.

Rates might be formed that would provide for the return of the whole premium paid along with the sum assured, they might even be returned with interest, but the rates would necessarily be very high, and it would in most cases be useless to quote them.

The great variety in the classes of assurance offered to the public in the 20th century, compared with 100 years ago, is

increased by the number of bonus schemes available. The principal tables 100 years ago were:—

Whole term uniform premium policies, whole term policies by one or five payments, and term policies for one or seven years.

In an up-to-date 20th century prospectus you will find:—

Whole term policies, with profits, without profits, with deferred profits, with discounted profits.

Whole term policies where the bonus is applied to limit the number of premiums or to convert the policy into one payable during lifetime.

Whole life policies premiums limited in number from one upwards.

Endowment Assurances payable at any age selected or at earlier death.

Double Endowments.

Half Endowments.

Term policies from one to any number of years.

Term policies with the option of transferring to another table without medical examination.

Joint-life policies of the same description as single-life policies.

Policies payable on the failure of any number of joint lives.

Policies payable on the death of the survivor of any number of lives.

Contingent assurances.

Children's Assurances, deferred and immediate endowments, and Endowment Assurances.

Issue policies.

Marriage policies.

Sanity policies.

Name and arms policies, etc., etc., with any number of pension schemes.

At the beginning of last century it appears to have been customary for Companies either to give profits or not to give profits at all. The same Company did not have profit and non-profit policies.

There were then thirty-two Companies transacting Life business, and of these eleven gave no bonus. Of eleven Companies charging the same premiums for whole term assurances, three paid no bonus, two gave the policy-holders two-thirds of the profit, one

gave four-fifths, another one-fifth, the remaining four, to all appearance, had no system and divided what they pleased. The rates charged by these Companies and the present profit rates of the three which gave no bonus are:—

Age.	Old Rates, charged by A. B. and C. Non-Profit.	Present Rates With Profits.		
		A.	B.	C.
20	£2 3 7	£2 1 7	£2 0 0	£2 0 5
30	2 13 5	2 10 8	2 9 2	2 8 11
40	3 7 11	3 5 5	3 4 10	3 4 7
50	4 10 8	4 11 4	4 10 1	4 10 8

The life proposed for assurance was not subjected to the thorough physical examination of to-day, but it was customary to appear before the Board of Directors, and a fine varying from 5s. to £1 was imposed for non-appearance. Persons who had not had smallpox or been vaccinated, or who had had gout, had their premiums increased from 10 to 12½ per cent. Insanity, fits, and rupture were made the ground of declinature.

The limits of travel allowed were not extensive. Of twenty Companies which defined their free limits, one allowed voyaging to any part of Europe in certain vessels, one allowed voyaging in packets to Ireland, and the other to ports in the English Channel.

One Company, which is still in existence, had the following in its prospectus:—"The Directors have established distinct Tables for assurance of male and female lives, in which the greater duration of the latter necessarily causes a considerable reduction in the premiums required for its assurance." It is perhaps hardly necessary to say that a reference to the present prospectus of the Company does not disclose such Tables.

It is interesting and instructive to compare the prospectuses of different Companies, and even to compare the different Tables in the same prospectus. An inspector doing so will be sure to find something of value to him in competition.

It is not always easy, even for an actuary, to make a really fair comparison of the profit rates of different Offices, because of the

uncertain element in each—bonus. There is no such difficulty, however, with non-profit rates, and I have therefore taken the whole term non-profit rates of seven Companies without in any way selecting them, and have placed them in a form in which they may readily be compared.

WHOLE TERM—NON-PROFIT.

Age.	A.	B.	C.	D.	E.	F.	G.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
20	1 11 5	1 10 0	1 10 4	1 13 2	1 14 4	1 12 1	1 14 4
30	1 18 4	1 18 10	1 19 6	2 0 10	2 1 9	2 2 0	2 1 9
40	2 12 3	2 13 5	2 14 0	2 15 2	2 16 2	2 15 11	2 16 4
50	3 16 5	3 17 0	3 18 9	3 19 7	4 0 10	4 0 2	4 1 4
60	6 0 5	6 1 0	6 3 4	6 4 6	6 5 6	6 6 0	6 6 7

SINGLE PREMIUMS—NON-PROFIT.

20	32 7 5	32 9 10	33 12 10	34 10 7	32 14 0	34 2 1	35 8 0
30	36 17 10	38 13 2	39 19 5	41 3 8	37 11 9	40 12 7	40 3 7
40	44 11 10	46 17 3	47 16 3	49 8 3	45 8 2	47 14 4	48 1 6
50	54 11 10	56 0 2	57 7 3	59 8 10	55 7 11	56 17 3	58 2 2

TEN PREMIUMS—NON-PROFIT.

20	3 18 1	3 17 6	3 19 11	4 1 8	4 1 8	4 1 6	4 5 6
30	4 8 8	4 12 7	4 15 5	4 18 0	4 13 4	4 18 1	4 16 6
40	5 8 1	5 13 4	5 15 4	5 19 1	5 13 4	5 16 6	5 16 6
50	6 15 6	6 19 8	7 2 5	7 7 8	7 1 4	7 2 9	7 4 3

I shall only point to one or two of the curious features they exhibit.

Two Companies, which at age 20 charge a uniform annual premium of £1 14s. 4d., quote as the equivalent single premiums £32 14s. and £35 8s.

Another, whose annual premium is £1 10s. 4d., requires a single premium of £33 12s. 10d., while a Company whose annual premium is 1s. 1d. more will take a single premium of £1 5s. 5d. less.

A Company whose whole Life rate at age 50 is £3 19s. 7d. requires £7 7s. 8d. if the premiums are limited to ten, while another Company whose whole Life rate is 1s. 3d. more is satisfied with 10 payments of £7 1s. 4d. or 6s. 4d. less than the other.

The differences are so numerous as almost to make one ask—Should we not have a non-profit tariff?

I shall not weary you with comparisons you can readily make for yourselves.

The most valuable prospectus a Life Office can issue is that which continually circulates among its agents and their clients, and is so lucid that it cannot be misunderstood, so persuasive that it cannot be controverted, so persistent that it cannot be denied. It can prove to a demonstration that the policy it offers is the only one that will meet the requirements of any proposer, that no other Company can offer such magnificent security, pay such large bonuses, and accept such low premiums. This valuable prospectus, good copies of which every manager is always ready to pay for, although not issued in crimson and gold, is often an edition de luxe, for it is sometimes as necessary to charm the eye as to beguile the brain. The prospectus I refer to is the agency inspector. He is a valuable, I had nearly said the most valuable, officer of a Life Company, for without him some of us would have very little to do.

But he must be able to thoroughly understand the schemes, sometimes complicated schemes, that are put forward by rival Companies, and if inspectors were to systematically compare other Companies' prospectuses with their own, and to write down the result of these comparisons for ready reference, I am satisfied they would find it much to their personal advantage and much to the advantage of their Companies.

THE VALUE OF NEW BUSINESS TO A LIFE OFFICE.

By D. Y. MILLS.

*A Paper read before the Insurance Society of Edinburgh,
March 1, 1904.*

Six years ago I read a paper on the cost of new business before the Insurance and Actuarial Society of Glasgow, and when your Secretary invited me to take up this subject again, he very kindly hinted that the old paper, brought up to date, would satisfy your requirements. I thought, however, that it would show a greater appreciation of the compliment paid me by your Council if I entirely re-wrote that paper, and I have therefore done so.

The expenses incurred in the procuration of new business form a subject of the greatest importance to all those engaged in the business of Life Assurance, and I have been surprised in looking back for several years past to find how few papers have been written about it. Thirty years ago our President, Mr. Deuchar, wrote one on the subject, pointing out, I believe, for the first time, that it cost much more to acquire new business than to look after old business, and suggesting that some allowance should be made for this fact when comparing the expenditure of one Office with another. What was true thirty years ago is true to-day, only more so, because since that time expenses have been shifted to a greater extent from renewal premiums on to those of the first year. Theoretically this may be an advantage, but as commutation of commission is undoubtedly one of the chief causes of policies lapsing, I have my doubts that it is so, and I know that some of our present-day managers look back with regret upon the good old days of "ten" and "five." In 1876 Dr. Sprague read his paper on the measurement of Life Offices' expenses, which probably had a

more far-reaching effect than any paper ever written either before or since. It came as a boon and a blessing to the managers of Offices with high expenses, for it not only proved that spending the whole of the first year's premium in obtaining business might be an economical proceeding, but it showed that a net premium valuation was unnecessary. There can be little doubt that Dr. Sprague's great name and world-wide reputation were used by some of these gentlemen to justify extravagance which he himself would have been the first to condemn. In 1889—thirteen years later—Mr. Harding, in a very laborious paper, showed that a big new business was more often than not followed by a falling-off in the profits to the individual policy-holder, and very strongly recommended those Offices whose new business totals fell between £300,000 and £400,000. In this I disagree with him; it is quite easy to separate the Offices who do a larger business than this by the attraction of their merits from those who obtain it by lavish expenditure, and in my opinion a Company cannot have too much new business, provided its quality is equal to, or better than, and the cost of its acquirement less than or equal to that which it has already on its books.

Unless they want to drop out of existence, all Offices must have a certain amount of new business every year to make good the waste by claims and discontinuances and leave a margin over for progression; and it is in refusing to rush in business in excess of this necessary amount that the self-restraint of so many of our British managers comes into evidence. They have all a natural desire to have larger totals in their annual reports. I don't suppose there is a single manager in the wide world who, if he were allowed to-day to fix his total of new insurances for 1904, would not put down an increase over 1903; but in spite of this wish to show what the public certainly regard as an outward sign of an inward prosperity, they do not lose sight of all other considerations. They know that the copartneries which have been committed to their charge will not be benefited if the new partners that are admitted are not carefully chosen, and they know that the cost of their business is of more importance to them than its magnitude.

Supposing all the managers of our best Offices were to alter their present attitude, and instead of looking primarily after the interests of their assured were to look after their own interests and determine to make a big business their first consideration. By so doing,

they might become the wealthy heads of gigantic institutions and be as important as the Presidents of certain American Companies with whose names we are so familiar, but what would be the result? Competition, about which so many complain already, would be increased tenfold. Branches would be established in every country on earth, civilised or uncivilised, healthy or unhealthy; foreign lives with an inferior expectation would be put on an equal footing with British lives; expenses would go up by leaps and bounds, and in a few years the business would be utterly ruined by the cost of conducting it. I doubt very much, however, if this self-denial as at present practised receives the acknowledgment it deserves. Directors like a big new business, and it is their nature to. Shareholders like a big new business because it may increase their dividends, and policy-holders like a big new business because they think it preferable to be connected with progressive concerns. It is the first thing mentioned in nearly every annual report, and it is the chief topic in every chairman's speech. The weaker and more extravagant the company, the greater is the jubilation when there is a million or two of new business to announce, and this one fact is taken by the ignorant as a proof of an excellent management and a sound position, whereas the contrary may be the actual truth and the outlook for its participating members may be gloomy in the extreme. Had the late Bishop Heber been writing of the annual meeting of such a Company instead of the Island of Ceylon, his well-known lines might have read :—

“Though every man is pleased,
And only prospects vile.”

The question has often been raised, What is the maximum amount that Life Offices should spend in the conduct of their business? My own idea is that only an oracular reply can be given, and that is—as little as possible compatible with the necessary progression of the Company; but some writers have indicated fifteen per cent. of the premium income as the point where the line should be drawn, and though this may be a good thing to tell the public, who are less liable to make a mistake if they act on it, it is just one of those arbitrary statements that cannot be supported by proof. We all know also that for many years past objections have been taken to this method of stating expenses. If

an old established Office has a premium income of one million and spends £250,000, it looks very simple and very right to say that its expenditure is 25 per cent. of that premium income; but an American manager informed me that he considered such a statement to be unfair and ridiculous, and an eminent Edinburgh manager in an able article on Life Assurance in the *Banker's Magazine* calls this method unscientific and to a certain extent misleading. There have been several attempts to provide a means of fair comparison of expenses between Office and Office; but until the new business is given in full detail, so that we may know exactly how the new premiums are made up, I look upon this as an impossible task. Some time ago I went into the figures of two Companies with which I am familiar, and I found, after making somewhat arbitrary divisions of certain items, that one half of the total expenses might be put against the new premiums. As this agreed with the conclusion arrived at by Mr. Deuchar, I fancied that I had discovered a solution of the expense comparison problem. When, however, I applied this test to a few Companies I soon found it to be useless, for it made the most economical Scottish Office spend 106 per cent. of its new premiums, while the most extravagant spent only 98 per cent. With regard to other and existing methods of comparison, there is no Company spending exactly either 100 or 50 per cent. of its new premiums, $7\frac{1}{2}$ per cent. on its renewals, or 10 times as much on one as the other; and as one or other of these suppositions is made the basis of their calculation, the result must be erroneous and misleading. Moreover, if we had such means there would still remain those invisible expenses which would make comparisons untrustworthy. By invisible expenses I mean methods of securing business which do not involve a payment in actual cash at the time of its acquirement. They consist of granting doubtful loans not requiring the protection of a Life policy, but to which big policies are attached for the sole purpose of bribing Companies to consider them favourably, and by accepting, at the ordinary rate, lives which should be charged an extra, either for foreign residence, hazardous occupation, or personal defect. Cases of the former are plentiful enough, and of the latter I will give you some actual examples.

Twelve years ago one of our best and most important mutual Life Offices started taking lives going to India at home rates. I believe the management has since discovered its error, but it is

obvious there was an extra cost here to the general body of policy-holders who remained at home, and as such business is very cheaply obtained it had the immediate effect of lessening the expenses of the year. Another Office, also mutual, granted policies to the extent of £500 on lives going to take part in the late South African War. This was a most patriotic thing to do, no doubt, but the exact cost of this extraordinary generosity with other people's money we shall never know. Dr. Sprague, in his celebrated article, said—"In order to determine the true order of Offices as regards economy, we must first ascertain what proportions of the new premiums and renewals are spent by each Company, and when we know this it is easy to calculate the pressure of the two upon the resources of the Company. If a Company spends the whole of its new premiums and seven per cent. of its renewals, taking the average age at entry to be 40, it is really only spending in the long run 12·8 of the total premiums it receives." This makes the average life of a policy about twenty-seven years, and though this may have been true 28 years ago, it cannot be so now. Lapses and Surrenders are more common, and Tontines, so called, which cut off whole life policies in the middle of their career, and Endowment Assurances completely upset the calculation; it is therefore specially erroneous when applied to certain American Companies, in which only one policy out of every five issued fulfils its natural destiny and becomes a claim, and very few policies contribute any premium income at all after their tontine period has elapsed. I have been through the latest annual reports of all Offices doing business in the United Kingdom, and I find that while no Company exactly fulfils the conditions laid down by Dr. Sprague, an American Company most nearly approximates to them at the present time, though its expenses are 25·8 of its total premium income. The equalisation process has, however, proceeded in the wrong direction, as this Company's expenses were exactly 12·8 at the time when Dr. Sprague read his paper. But I think most of us would prefer the figures of 1875 to those of to-day, though in the interval the Company in question has become one of the largest partnerships in the world.

Then the premium income was,	...	£1,144,489
The expenses, ... ..	...	145,925
The ratio, ... ..	...	12·8
The invested funds, ... ..	...	5,324,375
The interest receipts, ... ..	...	374,132
The rate of interest, ... ..	...	£6 16 2
Now the premiums are, ... ..	...	12,900,527
The expenses, ... ..	...	3,247,829
The ratio, .. ..	...	25·8
The invested funds, ... ..	...	65,507,505
The interest receipts, ... ..	...	2,661,983
The rate of interest, ... ..	...	£4 7 3

Well, we may say, how have the mighty risen !

The expenses of American Offices are now so high, not so much because they pay an inordinate price for their business, though that is high enough in the United Kingdom where no American Company has ever had the hardihood to publish its out-go, but because they often cannot retain their business when they have got it. This is due to the difference between their system and ours, which I will shortly explain. If we take a big provincial centre, a British Office will have a branch secretary and one or two salaried assistants, the business being obtained by their efforts in working among perhaps 300 spare time agents, many of whom will have been years and years with their Office. The American Company will perhaps have 30 salaried men on the same ground, a small proportion of whom stay a full year with them, and as each man goes most of the business he has introduced goes also, when only one premium or part of one premium has been paid. An American Branch Secretary told me that he had had 504 of such agents through his hands in three years, most of whom had a grievance against his Company when they were dismissed, and whose business, chiefly got from friends and relatives, departed with them. Much as we may deprecate this very expensive system, its success in gathering together an enormous business is undeniable, and though it may be true, as some folk say, that American Offices give the public what they like while British Offices only give them what they ought to like, it is difficult, when the matter is looked into, to say why their policies should be more popular than ours.

The premium of the Tontine or accumulation policy, as it is now

called, is really composed of two parts like a seidlitz powder, one part, which does the work for which it is taken (like the contents of the blue paper), provides the capital sum on the face of the policy, the other part provides the tontine bonus, and like the contents of the white paper gives a fizz and a froth to the mixture, making it pleasant for the patient to swallow. I propose to show what might happen if these two parts were taken separately.

At the average age of 40 the cost of a £1000 policy with profits is £33, without profits it is £25 18s. 4d. Suppose the latter be taken, there is a difference of £7 1s. 8d., which can be reckoned as a premium for an endowment payable only on survivance, this of course being a guaranteed bonus. From the last return to our Board of Trade I find the cash values of the accumulations on a £1000 policy at the end of each tontine period are as follows:—

Five years,	...	...	...	£30 11s. 8d.
Ten years,	...	...	...	78 0s. 0d.
Fifteen years,	...	...	...	142 11s. 8d.
Twenty years,	...	...	..	332 14s. 2d.

While the endowment would yield:—

In Five years,	...	...	...	£41 4s. 0d.
„ Ten years,	...	...	...	95 0s. 0d.
„ Fifteen years,	...	...	...	168 4s. 0d.
„ Twenty years,	...	...	...	273 12s. 0d.

I discovered this great discrepancy in favour of the 20-year tontines some time back, and asked a leading American official to explain it to me. This he did by stating that they did not consider those who wanted profits before 20 years were entitled to get them up to the hilt.

When we compare the annual bonuses they give, the result is still worse; but I am of opinion that initial expenditure has more to do with the matter than any desire to favour a particular class. In any case these results, which up to fifteen years do not give the participating member value for his contribution to the surplus, hardly prove the assertion of the American Company, that the bigger the business of a Company the better it is to belong to it. I am aware that there are some British Offices in which it would be more prudent to take a non-participating policy, but they are at the bottom of our list and not at the top, as the American Offices claim to be.

Since the Act of 1870 there has been a vast improvement in British Offices taken as a whole, and the publication of their accounts by the Board of Trade has caused the rotten and extravagant Companies which formerly existed to become almost extinct. In the first Blue-book published, there were 21 Companies spending more than 25 per cent. of their premium income; of these but four remain, and of these the two smallest are now quite in the first rank. Of the lengths some of them went to in olden times in bidding for new business, the following advertisement is a good example. It appeared in the *Kentish Mercury* forty years ago:—
“*An Annuity to Assurance Agents.*—Agents wanted in this locality for a Life Assurance Company upon the following unusually good terms. Fifty per cent. on all new premiums; ten per cent. upon the second year renewal premiums. In addition to which the five per cent. upon renewals will be continued to an agent's wife and family upon his decease, thus affording them an annuity for his exertions. None need apply who cannot give good references.”

Unfortunately for the wives and families of any agents who worked for that Company, it did not survive long to pay any annuities that had been earned. I fear there are still one or two British Offices who would give such terms even now; but I think that, with perhaps one or two exceptions, they will be found among Offices whose valuations leave something to be desired; an honest and stringent reserve is a fine check upon reckless commissions, and I observe that the expenditure of Life Offices is very closely connected with the reserves they make for their liabilities. Out of 47 Offices with funds of one million and upwards whose valuations are based on net premiums and not more than 3 per cent. interest, not one of them spends 20 per cent. of its premiums, and only eight spend upwards of 15 per cent.

It is, however, by increased reserves more than by decreased expenditure that British Offices have improved their position to the extent they have; but if expenses could be reduced, our Offices in the future would be still more in front of all those of other countries than they are to-day. Since the time of our President's paper in 1874 our business has greatly changed, and the class of business that has caused that change consists of endowment assurance, double endowment assurance, and capital redemption policies, and the component parts of our new premiums, which were then almost entirely made up of whole-life and survivorship rates, have

completely altered. With regard to endowment assurances, we have not yet felt their full influence upon our expenses. It costs exactly the same to procure a premium of £50 on an endowment policy of £1000 as a premium of £30 on a whole-life policy for a similar sum. It is therefore obvious that, while endowment assurances are coming in, they are a great help to the expense ratio; but when they begin to mature in large numbers, and the time is not far distant when this will happen, the effect will be reversed, as it will require increased efforts (which are synonymous with increased expense) to prevent our premium incomes from retrogressing. Some actuaries have stated that in their opinion endowment assurances should never have been issued at all, and one goes so far as to say that in his view this predominance of endowment assurance will not last, but the evil will endure long enough to inflict considerable mischief on the present generation. Unless, however, our expenditure gets beyond bounds I don't think there is much chance of his prophecy being fulfilled, for endowment assurance has been of the greatest assistance to those actively engaged in the business by removing an obstacle which prevented many people from insuring at all.

Double endowments are, of course, open to the same objection of not remaining so long on the books as whole-life policies, but I regard them as being particularly useful policies, as they can be used in many cases to avoid charging an extra premium. We all know how important it is to keep our agency connection in good humour with the Head Office, but there is no more constant source of friction than the small extra which if justice is to be maintained between member and member it is impossible otherwise to avoid. A double endowment may be looked on as an ordinary endowment with a large additional premium to be returned with compound interest only if the life insured prove a good one; and it has this great advantage over other methods of treating second-class lives, that it does not create discontent. From personal observation, which now extends over a good number of years, I am certain that Offices have no more spiteful enemies than under-average lives which have been rated as such, and which have turned out to be over-average, and are naturally dissatisfied with the bargain they have made.

The last class, which, when mixed up with our ordinary business, helps to hide expenditure, are capital redemption policies. They

have nothing whatever to do with assurance, as there is no contingency to provide against, but are simply deposits at compound interest repayable at a fixed date. They cost comparatively little in the way of first year's commission, and no wonder, because at current market rates, namely, 3 per cent., it is hard to see where the profit from them comes in. Curiously enough it is the Offices with valuations at $2\frac{1}{2}$ per cent., or equivalent to $2\frac{1}{2}$ per cent., who seem most fond of taking these deposits. Looking 50 years into the future for their assurance business, they do not think it prudent to reckon on receiving more than $2\frac{1}{2}$ per cent. on their funds, but looking 70 or 80 years into the future for their deposit business they think it quite prudent to reckon on receiving 3 per cent., plus income tax, plus commission, and plus expenses. Had these policies been in existence in 1870, Offices would probably have been prevented from mixing them up with their Life Assurance accounts, and some Companies do keep them apart as it is. These new Tables have made it in some respects more easy to obtain proposals, but the work of the Branch Secretary and the Inspector gets harder and harder as time goes on, for as agents multiply, active agents get more and more scarce, with the result that very little business is obtained except by personal intervention of the Branch Secretary or his assistant. The difficulties of these gentlemen are now greater than they ever were, and among other things we may put them down to the big increase in Life Insurance experts and Insurance guides. The expert or broker often represents an American or Colonial Company, because of the larger commissions that can be obtained from them, and if they do business with British Offices they put a value on their services in excess of that given to the regularly appointed agent. Why this should be so I cannot say, for they use their knowledge against the Companies who pay them by selecting the most favourable rates for their clients, which is, of course, the least profitable for the various Companies they deal with. I got a friend who lives in a remote part of the country to reply to two of their advertisements. The first recommended one of our very best Offices, and offered a rebate of 6s. 8d. per £100 assured from the first year's premium; the second recommended a Colonial Company which was not in a position to pay any permanent bonus to its policy-holders at its last division. Notwithstanding this, a comparative statement was enclosed showing that it gave better results than any British Office.

Misleading guides to insurers are not, I am sorry to say, confined to these gentry. I have seen them issued by British Offices and in American prospectuses. Of course, we cannot complain of the figures in the Blue-book, which we have ourselves supplied, being copied elsewhere; but the Blue-book contains past results only, which become in the guide guaranteed estimates for the future. Thus an Office paying temporarily a very high bonus once issued a statement showing that this bonus would be paid for the next thirty years, while alongside was another good Company which had temporarily paid no bonus, and which was made to continue paying none for the same lengthy period.

In former times the Branch Secretary or agent had only to overcome the reluctance of people to insure in order to secure business, but nowadays he has generally to show that his Office is superior to some other, and all this means extra cost in time and money before the first premium, or what is left of it, gets into the Head Office till. I fancy it would be an impossible task to try and find a remedy for this competition, for I look upon it as unavoidable; but we may find a palliation, and for that I have two suggestions to make. One is a closer unity between Head Offices and their Branches, and the other a closer unity between Offices themselves. Firstly, it is obvious that one of the simplest means of keeping down expenses is to obtain as much business as possible for the money we devote to that purpose, and I have no hesitation in saying that the best way to secure this desirable result is to make the relationship between Head Office managers and branch men that of friend to friend rather than that of Czar to serf. As a former branch man I had knowledge of both kinds of treatment, and I know from personal experience which urged me to greater exertion.

Secondly, a combination among the economical Offices to keep down commissions would, apart from its utility for this purpose, be a costless and splendid advertisement to the British public, from which we should all derive benefit.

Looking at British Life Assurance business generally, I see nothing to make one take a desponding view of it, in spite of the fact that the present depreciation of securities is temporarily depriving some British policy-holders of part of their expected profit; nor do I think we need be hurt by American competition, or suffer from Colonial preference, especially while the Colonies

keep their best Companies away. But the fact must not be lost sight of that we have among us Offices who take a lot of British business, and would take a lot more if they were able to do so. The best way of preventing them is not by vying with their extravagance, but by British managers continuing to regard the interest of their assured as preferential to any personal profit or aggrandisement of their own.

THE MAIN PRINCIPLES TO BE FOLLOWED IN THE SELECTION OF LIVES BY A LIFE ASSURANCE COMPANY.

By JOHN B. HALL, A.I.A.

*A Paper read before the Insurance Institute of Toronto,
April, 1904.*

I. INTRODUCTION.

IN the early days of assurance but little, if any, discrimination was made among the lives presented for assurance, and such a thing as medical selection by a medical adviser was unknown. For the first life assurance conducted upon a rational and scientific plan we must look to the Equitable, founded at London in 1762, of which Dr. Holden says—"Its history gives the best selection up to the advent of insurance in America." This Company, when it commenced, required of the proposer a health certificate bearing the signatures of two witnesses, one of

whom had to be a physician. This certificate, however, was passed upon by only a lay board, and it was not until some years later that a medical adviser was appointed. In the case of American Companies selection by medical examiners was practised from the outset. The physical condition of the applicant, however, was all that was at first taken into consideration, practically no attention being paid to personal history or to family history. Even examination into the physical condition was far from thorough. Dr. G. W. Russell, Medical Director of the Etna Life Insurance Company, in a paper read before the Association of Life Insurance Medical Directors in 1897, on "Selection of Lives for Insurance," says—"Without going into the history of life insurance in this country, it is sufficient to say that the early requirements for insurance were brief and pitiful. The personal examination was not thorough or minute; the fact that a man wished to be insured was almost *prima facie* evidence that he ought to be insured, and he was insured. Such careless business methods were enough to bring ruin upon many Companies, as they did, and the wonder is that so many survived. Nothing but a more careful consideration of applicants and a more thorough inquisition as to habits, occupation, family history, and physical conditions saved them from destruction."

As time went on competition in insurance increased, commissions to agents became larger, and the agents consequently more aggressive, and, to protect themselves from the increased danger thereby incurred, Companies were forced to make a more careful scrutiny of risks and their application blanks more elaborate.

This in brief is the early history of the growth of Selection.

The value of medical examination and of careful selection has been well borne out by the experience of different Companies, and is well demonstrated in the following Table constructed by Bloomfield L. Miller, Actuary.*

* Proceedings of the Actuarial Society of America, Vol. i., p. 75.

Table Showing Effect of Selection.

Includes—Experience of Mutual Life from 1843 to 1873 inclusive; Experience of Connecticut Mutual (Males) from 1846 to 1877 inclusive; Experience of Mutual Benefit from 1845 to 1887 inclusive.

Year of Membership.	Probable Deaths, Am. Exp.	Actual Deaths.	Ratio of Act. to Prob.
First	1,904.52	1,216	.638
Second	2,510.60	1,773	.706
Third	2,255.40	1,700	.754
Fourth	2,096.79	1,724	.822
Fifth	1,963.75	1,660	.845
Sixth to tenth	7,762.04	6,753	.870
Eleventh to fifteenth	4,070.54	4,391	.866
Sixteenth to twentieth	3,556.08	3,107	.874
Twenty-first to twenty-fifth	2,350.04	2,149	.914
Twenty-sixth to thirtieth	1,043.30	951	.912
Twenty-first to thirty-fifth	372.67	342	.918
Thirty-sixth to fortieth	276.80	253	.914
Forty-first to forty-third	61.04	54	.885
First to forty-third	31,223.57	26,073	.835

Having in mind the comparatively lax selection of earlier years, this is a remarkable showing.

As a further illustration, we may take a condensed Table prepared by Dr. George R. Shepherd from the experience of the Connecticut Mutual Life Insurance Company from 1847 to 1894, showing the number of deaths from consumption among the first 25,000 deaths in the experience of this Company.

First 5000 deaths, 1847 to 1873,	..	..	997.
Second 5000 deaths, 1873 to 1880,	..	..	853.
Third 5000 deaths, 1880 to 1885,	..	..	508.
Fourth 5000 deaths, 1885 to 1890,	..	..	378.
Fifth 5000 deaths, 1890 to 1894,	..	..	272.

With reference to this Table, Dr. Shepherd remarks:—"The above shows very markedly the beneficial effects of selection as it has gradually developed during the last fifty years. Some allowance, of course, must be made for improved methods of treatment in consumption and care of those afflicted with the disease, thus diminishing the mortality, but the great improvement in our Company's mortality was undoubtedly due to wise selection."

The effect of careful selection upon the financial standing of a Company is well brought out by Mr. J. W. Alexander, President of the Equitable Life Assurance Society of the United States. He says:—"This side of the management of a Life Assurance Company is of the first importance. A half million dollars in the death claims for one year in one of the largest Companies may be saved by the application of wisely directed attention with far greater ease than one hundred thousand dollars can be saved in expenses."

II. THE COLLECTION OF DATA.

The work of selecting from the numerous lives Chief Medical making application for insurance, those upon Referee. whom insurance can be safely granted, devolves upon the chief medical referee of the Company. Upon him and upon the actuary rests the responsibility of deciding upon what plan and at what premium rate the life may be safely insured. They have not the applicant before them in person; they have only a number of reports from the agent and the medical examiner, in which are recorded facts relating to the applicant, and on the basis of these reports a decision must be arrived at. It therefore requires that the medical referee shall be a man of wide experience in the medical profession, and possessed of that rare quality of being able to generalise with accuracy from a large number of observations. Almost any medical man is capable of gathering together the necessary facts, but the application of them is perceptible to only a few. In the words of Dr. J. E. Pollock, "General delicacy, modified, it may be, by careful or careless modes of living; incidents of social life which have disordered vital power; complicated heredity to disorders which shorten life, and habits which tend to precipitate or ward off such ailments; a family history showing longevity or the reverse; the occurrence of slight ailments, which, separately,

are of little moment, but, concurrently, lower the system; such are some of the problems often placed before the physician, who is expected to be not only 'faithful, but far-seeing.'

The chief medical referee's decision is based, as we have said, upon the reports submitted by the medical examiner. The Company furnishes the medical examiner with blanks upon which these reports may be made, and it is his duty to see that all questions in these blanks are fully and clearly answered.

There are, as a rule, two reports which are required of the medical examiner. The first report is a statement over the applicant's signature of all the facts known to the applicant relating to his habits, past and present, his personal history—comprising a history of all diseases, disorders, or injuries from which he has at any time suffered—and his family history. This report is filled in by the medical examiner, and it is his duty to obtain from the applicant, by close questioning, all the information possible in answer to the questions asked.

The second report is also in the form of a series of answers, and is based upon the actual physical examination of the applicant by the examiner. This examination should be made in private. The aim is to find out the presence of any disease or abnormality in the applicant, and to look for indications of any previous trouble; and the examiner will find himself greatly assisted in his investigations by referring to the answers made by the applicant in the first report. The general appearance of the proposer should first be taken into consideration, such as the condition of the face, which may indicate intemperance, sensual habits, temper, and self-command, or nervous excitability of character; also the manner, gait, twitching of muscles, inability to walk straight, peculiarities of the eyeballs, and facial muscles. Finally, the whole aspect of the man should be noted. Examinations should be made of the tongue, throat, teeth, and hands. The measurements and weight should be accurately taken and any discrepancy noted. In examining the heart and lungs the chest should in all cases be bared, and the heart sounds and quality of the respiration carefully noted. The rate of the pulse, both standing and sitting, and its quality should be taken, and also the temperature under the tongue, although until quite recently this latter item was not required by Companies. A chemical analysis of the urine, and in the case of applications for

large amounts, a microscopical examination should in all cases be made, and the sample should, whenever practicable, be voided in the examiner's presence. The applicant should be examined for evidences of successful vaccination, also for the presence of hernia. The hepatic area should be examined for any indications of disease of the liver. In the case of female lives false modesty should not be allowed to interfere with a thorough investigation. The apparent age of the applicant should be arrived at without reference to his actual age. If the applicant appears to be much older than he really is his chances of life are much prejudiced. Finally, the examiner should candidly give his own unbiased opinion of the life, stating to what age, in his opinion, the applicant may reasonably expect to attain. Any information which he considers would be of value to the medical referee, but which has not been brought out in the answering of the questions asked, should be forwarded to the office in a confidential letter. With reports carefully prepared to the fullest detail in his hands the work of the chief medical referee is much facilitated.

In referring to the requirements of the medical referee, Dr. Thomas H. Gage says:—"What I desire always to impress upon examiners is the vital importance of a clear, full, and accurate statement of all facts bearing upon an applicant's insurability, not only with regard to things inquired about in the form, but with regard to many others which may come within his knowledge. It is not so much the *opinion* of the medical examiner that a medical director wants, however valuable that may sometimes be, it is *facts* upon which he (the medical director) may base *his* opinions." As an illustration of this fact, it may be said that one of the large old line Insurance Companies rejected in a certain year 1803 applications. Of these 397 were declined by the local examiners.

I believe that it is a most important principle to be followed by Companies, if they wish to make a wise selection of risks, to see that their examiners are efficient and reliable men who will do their utmost to see that the chief medical referee is furnished with the fullest and most reliable information possible in answer to the questions asked in the blanks. Unless this principle is adhered to the medical referee must either base his decision upon insufficient and untrustworthy data or he must be caused a great deal of trouble and unprofitable delay in securing the additional information which he desires from the examining physician.

In the preceding paragraphs these blanks have Application and been referred to, and before proceeding further Medical Blanks. it might be well to enumerate some of the more important questions which they should contain, if the medical referee is to be furnished with material sufficient to enable a proper selection to be made. It would be out of the question and also irrelevant to take up each minute question which might be asked.

contains, of course, all particulars concerning the plan, amount, and other items relating to the The Applica- tion proper particular policy desired. It also contains certain questions, the answers to which are to be taken into consideration in estimating the value of the life.

1. Questions are asked about the applicant's occupation, and these questions should be so constructed as to obtain full information concerning his present occupation, any previous occupation or occupations in which he has engaged and any change which he contemplates making in his occupation. It is especially important that information be obtained as to whether he has been engaged in any way, whether directly or indirectly, with the manufacture or sale of intoxicating liquors.

2. A question should be asked to learn whether any change of residence is contemplated.

3. The insurable interest of the beneficiary in the life of the applicant should be inquired into.

4. Information should be obtained regarding insurances in other Companies or Societies, which are either in force or have been allowed to terminate.

5. The applicant should be carefully questioned regarding any proposal which he may have made to any other Company, and which has met with unfavourable treatment.

In the case of the *second report* the applicant is required to furnish answers to the medical examiner to the questions asked, of which the following are the more important :—

The applicant should be required to give full
1. Family information concerning his parents, brothers, sisters,
History. and grandparents. In the case of those living, their age and state of health must be given ; in the case of deceased members, the date of death, the age at death, the specific cause of death, the duration and details of the last illness and state of health previous to death must all be noted. The

medical examiner should be cautioned not to permit the applicant to make use of indefinite terms in giving cause of death. Such terms as "change of life," "debility," "exposure," and others convey no definite meaning, and it becomes necessary to obtain more definite information before any decision can be arrived at. Additional questions should also be asked to find out whether any member of the applicant's family or any of his blood relations has died from any form of lung disease or from any of the so-called hereditary diseases—consumption, scrofula, apoplexy, insanity, gout, syphilis, etc. If the applicant is married he should be asked to give the state of health of his wife and children, if living, and the date of death, age at death, and the cause of death of any who have died.

In the foregoing paragraph I have stated that information should be required concerning the applicant's grandparents. A great deal of difference of opinion, however, exists with reference to this question. Thomas Glover Lyon, M.A., M.D., Medical Officer of the Mutual Life Assurance Company (London), in a paper read before the Association of Life Insurance Medical Directors in 1897, dealing with the construction of medical examination forms, says:—"I believe that questions outside the immediate family history are worse than useless. I have been unable to think of any case in which this kind of information would be useful. In some cases it might even give a bias to judgment, as, for instance, when we have before us a rather doubtful life, and the grandparents are reported to have lived to great old age, the parents being still alive, but not yet old. . . . Besides all this it is, I believe, practically impossible to get correct information concerning relations outside the immediate family circle." In the discussion of the paper Dr. E. J. Marsh of the Mutual Life Insurance Company of New York supported Dr. Lyon in his views on this question, as also did Dr. F. S. Grant of the Provident Savings Life Assurance Society. Dr. G. W. Russell of the Etna Life Insurance Company, however, was of a different opinion. He says:—"The grandparents may not have died from any particular disease, but if you find there is a tubercular disposition in the family, in his parents or brothers and sisters, and you find that the grandparents died at a comparatively early age of some disease of the heart not well defined, or apoplexy or paralysis, or perhaps some disease of the kidney, if the answers are true you get some assistance in arriving at a very safe

conclusion." In a recent paper read before the Chicago Medical Examiners' Association, Dr. A. C. McOlanahan also advises that questions relating to the applicant's grandparents be omitted from the examiner's report. It appears that the main objection to inserting this item in the medical reports is that the information elicited is usually of a very unreliable character, as the applicant, being in many cases ignorant of the actual facts, very often substitutes fictitious ages of death and causes of death. Opinion, however, seems to be pretty well divided, and until more unanimity is expressed it would appear that the safer course would be to still retain this item in the medical reports.

Perhaps the most important series of questions

2. **Habits.** found in this report are those which refer to the habits of the applicants. In obtaining the answers to these questions the examiner will require to exercise a great deal of tact in order to bring out as much and as accurate information as possible. He should permit no evasive or indefinite answers to be given. Where the applicant has admitted that he uses intoxicating liquors, inquiry should be made to find out the average amount consumed per diem, an amount which the applicant almost invariably under-estimates. Indefinite terms such as "occasionally," "very rarely," "no habit," etc., convey no positive information, and must not be used in making out the report. The expression "often not for a month" may very logically be interpreted to mean that a month is the interval that is allowed to take place between "sprees." Drinkers may be divided into three classes; "steady drinkers," "spree drinkers," and "sneak drinkers," of which the last is the most dangerous and the first the least dangerous. It is the examiner's duty to find out to which class, if any, the applicant belongs, and if he is unable to obtain this information directly from the applicant it should be obtained from some other reliable source. A record of past habits is of fully as much importance as one of present habits, and inquiries should be made to find out whether the applicant has ever taken any cure for intemperance. If the applicant has at any time used opium or other narcotic, or if he has ever taken treatment for the drug habit, his answers will, as a rule, be evasive, but the examiner should be able to judge from his manner and general appearance whether any such habit exists.

Information should be obtained concerning the
3. Surroundings. surroundings of the applicant, whether his work is sedentary or otherwise, and whether he lives where sanitary conditions are favourable or otherwise, also whether he has ever lived in the same house or in close contact with a consumptive.

The applicant should be asked to give a full
4. Medical History. history of all diseases from which he has at any time suffered. With reference to this subject

Dr. Thomas Glover Lyon says:—"Regarding the categorical questions about past illnesses, I am of opinion, not apparently shared by all my colleagues, that they should apply only to occurrences not properly called diseases, and to diseases which do not lay a patient up, but are of great importance in life assurance. These are blood spitting, shortness of breath, violent pain in the chest (angina), discharge from the ear, jaundice, piles, and stricture." Dr. E. Curtis, in the discussion on Dr. Lyon's paper, says:—"In the matter of the inquiries as to the medical history of the applicant, I am glad to see Dr. Lyon make the point that the inquiries should not be so much as to what actual diseases the subject may have had, but rather to what symptoms the subject may have experienced;" and Dr. E. J. Marsh is also of the opinion that it is better to indicate the symptom or condition rather than the demand. It would appear, therefore, that the questions relating to medical history should be put in such a way that the applicant will be led to give details of every trouble, whether serious or not, from which he has suffered.

Where there is a record of a previous illness, and suspicion is aroused that such illness was of a more serious nature than the applicant would lead one to believe, it is desirable to obtain more definite information from the attending physician.

With reference to the *third* section of the report, containing the results of the physical examination of the applicant, nothing further need be said than has already been referred to in the paragraph on "*medical examiners.*"

Speaking generally, in the preparation of these application blanks the Company should have them so constructed that the information desired shall be given as clearly and directly as possible. Too great multiplicity of questions is to be avoided. If they are made to cover many minute points it is possible that

their apparent exhaustiveness may lead to the omission of some really important fact. On the other hand, the reduction in the number of questions should not be carried too far, as by so doing that Company might fail to elicit information which might prove of great importance.

III. SELECTION OF LIVES FOR INSURANCE.

In the foregoing paragraphs have been given the main principles to be followed in the securing of the data required by the chief medical referee as a basis for his decision. The paragraphs following deal with the different questions pertaining to the life which appear in the application blanks, showing the effect which the facts brought to light by these questions have upon the insurability of the life.

In dealing with the subject of occupation in **Occupation.** its relation to life insurance, Mr. Charles Lyman Greene, M.D., a well-known authority, states that the question must be considered in the several quite distinct aspects presented by different callings:—

1. The moral hazard introduced.
2. The question of excessive mental strain.
3. The general sanitary conditions present, including exposure to heat, cold, and general unhygienic conditions.
4. Special conditions leading to the introduction of various organic or inorganic poisons into the body.
5. The influence of prolonged and unusually severe muscle strain, of cramped positions, or of repeated and excessive activity of certain definite neuromuscular units.
6. Liability to accident.

It is doubtful if any advantage would be gained by substituting another order of treatment for that outlined by Dr. Greene.

Lives involving a moral hazard must as a rule
1. **Moral Hazard.** be declined. This class includes persons of notoriously bad habits or those whose means of livelihood are such as to suggest immoral living. It also includes those engaged in the liquor business, such as bartenders, saloon-keepers, distillers, wholesale liquor dealers, brewers and brewery employees, travelling salesmen for liquor or tobacco houses, bar supplies, etc. Lives in this class should not be accepted unless for short term policies, or at advanced premium rates. They

have constantly before them the temptation to drink, and, while they may sometimes be accepted where they are known to be total abstainers and where other conditions are satisfactory, yet they can never be considered as good risks. The truth of this statement is brought out very clearly in the results of the Specialised Mortality Investigation recently undertaken by the Actuarial Society of America. The experience in connection with two classes of those engaged in the liquor business, often considered to be good risks—hotel keepers not attending bar, and wine or liquor sellers, abstainers—has been anything but favourable. More unfavourable still has been the experience among wine or liquor sellers, non-abstainers, while brewers and their employees have been shown to belong to a still more hazardous class. This investigation shows a rather favourable experience, during the early years of insurance, among distillers and their employees, but less favourable during the later years.

Speaking broadly, it may be said that, in the case of all occupations, where, from the very nature of the occupation or from the associations formed by reason of being engaged in such occupation, there is an ever present temptation to irregularity of living and to over-indulgence in intoxicating liquors, a moral hazard is introduced which must be given most careful consideration when dealing with a proposal for assurance.

The statement cannot be questioned that mental
2. Excessive strain, brought on by business worries, family
Mental Strain. troubles or financial losses, affects invariably the
health of the individual. Periods of financial
depression have left long lists of diseases and deaths in their wake. It is well, therefore, to exercise great care in treating with applications for assurance from persons who are financially embarrassed or who belong to that class known as speculators. Managers of large financial institutions, executive officers railroads, and others, who, in any way, have great responsibilities resting upon them, are often under severe mental strain, and are consequently liable to various forms of nervous disorders. Lives from this class are not considered as first-class risks. The experience brought out by the Specialised Mortality Investigation before mentioned, in connection with persons who have been assured for sums of 20,000 dollars and upwards, may be considered as having some bearing upon this question. This experience shows that, notwithstanding the care that has always been taken

in the selection of such risks, the result is unfavourable except upon young entrants. The inference is, that assurances for large amounts should be made with extreme care, especially upon old lives.

The sanitary conditions surrounding a life
 3. **Sanitary** have a very decided bearing upon its health and
Conditions, longevity. Persons whose occupations compel them
Etc. to work in close, dusty, or ill-ventilated quarters,
 cannot be considered as such good risks as those
 living under more favourable conditions. In the treatment of
 cases where the sanitary conditions surrounding the applicant are
 unfavourable the personal health of the proposer will largely
 influence the decision of the medical referee, and each case will
 have to be considered upon its merits.

There are large numbers of people, especially
 4. **Occupations** in manufacturing cities, who, by reason of
Involving the their occupation, are made the victims of slow
Risk of poisoning by substances used in manufac-
Poisoning. turing.

Arsenic must be milled, ground, and smelted, and employees
 may be poisoned by either fumes or dust. *Arsenic* is also used
 in tinting wall paper, in the manufacture of certain aniline dyes,
 in colouring toys, in artificial flowers, lithographing, and shot
 making. It also enters largely into the dyeing of certain goods.
 Persons whose occupation renders them liable to arsenic
 poisoning cannot be considered as insurable lives.

Poisoning from *mercury* takes place among workmen in
 smelters and in quicksilver mines, and among hatters and mirror
 makers. Lives engaged in any of these occupations are debarred
 from the benefits of assurance.

Lead poisoning is perhaps the most common in this class. It
 is found among lead smelters, refiners, sheet-lead rollers, lead-pipe
 makers, shot makers, type-founders, type-setters, lead toy-makers,
 plumbers (from solder fumes), painters, furniture workers in
 lacquer, especially polishers, gilders, bronzers, lace makers, arti-
 ficial flower makers, makers of wall papers, flint glass workers,
 glaziers (putty), enamel workers, makers of brass instruments,
 weavers, straw hat sizers, file cutters, makers of white lead, red
 lead and litharge, and calico printers. Workers with lead are
 subject to paralysis of various forms and albuminuria, and cannot
 be accepted except in very rare instances.

Phosphorus poisoning is very rare, being confined to workers in match factories.

Copper, zinc, and tin may produce chronic poisoning.

Chlorin is used chiefly as a bleaching agent. It is an irritant to the respiratory organs and predisposes to asthma and phthisis. *Bromine and Iodine* have the same effect.

Carbon bisulphide is used largely in rubber working, particularly in the vulcanising process. Its effects on the health are very severe.

Occupations which involve the inhalation of dust are very injurious to the health, and those who follow such occupations cannot be considered as safely insurable at ordinary rates. In this class are grinders of steel, miners, glass, stone and gem cutters, cotton and flax workers, millers, workers in bleaching powder, brush makers, hatters, wool and fur workers, and bone and ivory workers.

It is seldom that applications for assurance are received from persons following any of the occupations referred to in the foregoing paragraphs, but the possibility of receiving such applications must be taken into consideration. Whenever such applications are made, great care must be taken to learn the exact nature of the occupation. Experience has shown that, in the few cases where such lives have been accepted, the result has been unfavourable. The Specialised Mortality Investigation of the Actuarial Society of America shows a most unfavourable experience in the case of steel-grinders and glass-workers, two of the few occupations investigated by them.

- This class includes type-setters, bricklayers, artificial flower makers, seamstresses, tailors and others. The effect on longevity, however, is not serious, and therefore this class may be left out of consideration.
5. Occupation involving injurious Exercise.

The various occupations involving risk from accident are too numerous to mention in detail.

6. Risk from Accident. Many of these occupations debar the applicant from insurance of any kind, the risk involved is so great, and in the case of others insurance can be granted only at an increased premium. It is only by carefully considering the exact nature of the occupation and the risks incurred, that a proper estimate of the insurability of the life can be arrived at, and each case must be decided upon its merits. In this hazardous

class we have employees on railroads, on boats of all kinds, in sawmills, and in manufacturing shops where machinery is in operation, workers in foundries, firemen, policemen, and others engaged in the maintenance of law and order, soldiers, miners, telegraph linemen, those who are liable to come into contact with live wires, those handling explosives, workers in steel works, lumbermen, general labourers, and many others.

The Specialised Mortality Investigation shows the following results in connection with hazardous occupations :—

Army risks in time of peace are not satisfactory. Officers in the Navy have proved an unprofitable class at all ages of entry, in accordance with prior experience, as well as with the results upon other classes of seafaring risks.

The class comprising civil officers, such as marshal, sheriff, police, constable, etc., shows unfavourable results throughout the term of insurance, except upon old entrants.

The class consisting of members of paid fire departments in cities shows unfavourably.

A heavy mortality is shown among labourers, except among young entrants.

Of railroad employees, railway passenger conductors show a mortality only slightly above the average, express messengers and mail clerks show very favourably, railway passenger trainmen give uniformly bad results for all ages at entry, locomotive engineers show bad results, and locomotive firemen still worse.

Unfavourable results have been experienced upon the class composed of officers of ocean steam vessels and officers of sailing vessels on ocean or great lakes.

“With reference to all of the classes mentioned, as well as others, it must not be forgotten that the statistics now collected relate only to persons actually selected for insurance by prudent Companies.”

In dealing with the question of conditions of life and occupation in his *Medical Handbook of Life Assurance*, Dr. Pollock says :—
“The life which is protected from the vicissitudes of fortune by a fair provision for daily wants, which has occupation for both mind and body without undue strain or the necessity for hurry, and which has daily exercise in the open air combined with a moderate amount of sedentary work, is undoubtedly the best risk.”

This question of occupation is a large one and cannot be treated comprehensively in a paper of this length. Most Companies have printed lists of occupations which are considered hazardous, and

have clearly defined the course of action to be taken by them in each case. At the present time Companies are very well informed as to the effect of occupation upon the insurability of lives.

Some importance must also be attached to the

2. **Residence.** question of residence when considering an application for assurance. It is well known that residence for any length of time in a tropical country or in a notoriously unhealthy district has a detrimental effect upon longevity. Tropical climates have their peculiar disorders, and districts of a malarious kind will often leave a tendency to intermittent returns of disease acquired there. Companies, as a rule, charge special rates of premium for risks in tropical countries, and, where a person expects to travel in tropical countries, an extra premium is usually charged, depending upon the locality, season of the year, length of stay, employment, and other attending circumstances.

It is usual in application blanks to ask questions similar to the following :—

- (a) Where do you at present reside?
- (b) Have you any intention of changing your residence?
- (c) Have you ever changed or been advised to change your residence for the benefit of your health?
- (d) Have you ever lived with or been closely associated with a consumptive?

The last two of these questions often bring out most valuable information which might not otherwise be obtained. If the answers given are in the affirmative or are unsatisfactory, the suspicion of the medical examiner and of the medical referee is aroused and a more careful scrutiny of the risk from a physical standpoint follows. In many cities cases of arrested tuberculosis are to be found in large numbers, and such persons frequently have but few signs recognisable by the hasty or formal examination. This is especially true in the case of the cities in the southern states and on the seashore which are considered as health resorts.

Dr. C. L. Greene, in referring to age, says :—

3. **Age.** “This is a matter of vital importance, for it determines the rate of premium and the question of acceptance or rejection. Applicants under eighteen or over sixty-five years of age ordinarily are not accepted.”

A question often found in medical reports is—“Does age of the the applicant appear to be greater or less than that given?”

Everyone has noted the fact that some men appear to be much older than they are, and many young men to-day are found with the grey hair and the rigid vessels of old men. There is an adage, that a man is as old as his arteries, and bearing this in mind, we see at once that these old young men cannot be considered as first-class risks. In summing up some remarks on this question Dr. C. L. Greene makes the statement that any rapid ageing of an individual is to be considered of serious import, and no man should be recommended for insurance at ordinary rates who is in appearance decidedly older than his stated age.

Age has also a decided bearing upon predisposition to different diseases. The young man under 25 years of age is more liable to tuberculosis and respiratory diseases than an older man, especially where any hereditary tendency exists. The best risks are those between 25 and 35 years of age; at this stage heredity has, as a rule, been outgrown, and diseases brought on by external agencies are better resisted. A decline of vital powers may be expected at from 40 to 45. At older ages there is a liability to diseases such as gout, apoplexy, degeneration of organs, and urinary affections.

From the experience of the Mutual Life of New York it is shown that the effect of selection diminishes rapidly on younger ages, slowly at middle life, and among older insurants probably never disappears. It is very much more easy for an examiner to judge of the expectancy of a middle-aged man or of an old man than of a young life.

Sir Robert Christison, in one of the earliest and best reports ever written regarding the medical selection of lives for insurance, says that when a man has reached the age of 40, and still more of 50, his habits, the influence of occupation, his personal liability to disease the constitutional infirmities of his family, and other less important circumstances, are, in general, developed by that time and easily ascertained.

Dr. Edgar Holden, President of the Association of Life Insurance Medical Directors, in a valuable paper read in May of 1897, draws special attention to the favourable death rate experienced among middle-aged lives, provided a careful selection has been made. He believes that this class of lives should prove very profitable, if they are chosen with a proper understanding of the special problems involved. He states that, in connection with his Company, the Mutual Benefit Life, on nearly 34,000,000 dollars at risk on lives between 38 and 50 years of

age the rate of mortality had been but 42 per cent. of the tabular expected loss. "The special difficulties attending the selection of middle-aged lives arise chiefly from (a) the curious latency and obscurity of the symptoms attending serious disorders; (b) the tendency to conceal important evidence of degeneration, such as loss of weight, mental torpor, slight dizziness, failing memory, trifling dyspnoea, frequent urination, slight unilateral weakness of extremities, fibrillar twitchings, fulgurant pains, or localised anesthesia, all points readily overlooked unless attention is drawn to them; (c) exaggerated statements as to family longevity; (d) a failure on the part of the examiner to appreciate the alternative conditions due to hereditary predisposition."

It would appear, therefore, that although a young life, if healthy and possessed of a good family history, is usually regarded as a better risk than a life rather advanced in years, yet the older life, if a proper selection has been made, belongs to the more profitable class. The reason of this is seen to be that a more accurate estimate can, as a rule, be made of the expectancy in the case of the older life than in the case of the younger, and that the benefit of selection is of longer duration in the case of the life past middle-age.

By the habits of the applicant we mean his
 4. **Habits.** general mode of living, his opportunities for exercise, and his practice with regard to intoxicating liquors and other narcotics. It is the last of these three sub-divisions which demands special attention. Insurance Companies regard intemperance with great disfavour, and, in the drafting of their question blanks, they take special care to formulate questions which will bring out information of the most exhaustive character having any bearing upon the applicant's habits in this respect.

With reference to the subject of intemperance, Dr. J. E. Pollock, in his *Medical Handbook of Life Assurance*, says:—

"Intemperance is perhaps the most formidable enemy to the safe assurance of life. It ranks before phthisis in its deadly effects on the human system. Not only is it often inherited, but organic ailments are, by it, originated and organic weakness crystallised into disease. The tendencies to disease—such as phthisis, gout, rheumatism, and diabetes—are by it converted into actualities. . . . The degenerations of age are anticipated and precipitated by alcohol, and the dram drinker is thus sure to

have a shortened life. . . . It is the man who carries his drink well and is always under the influence of it who is the greatest danger. We must therefore decline to attach any value to the statements of a proposer or his friends that he 'never was known to be drunk.' Small doses of stimulants taken repeatedly through the day, and ended by a somewhat larger one at night, leave the system charged with alcohol, from which it is in fact never free, and the excretory organs are therefore continuously under its influence. . . . We may forgive the rare outbreak of the youthful on certain festive occasions, if we are satisfied that the habit of drinking in the day hours has not been acquired, but we cannot pass the proposer whose daily habit is to take stimulants three or four times in the twelve hours. Drinking between meals should always be inquired about in cases in which we have any doubt about habits."

Dr. Pollock then proceeds to classify the victims from intemperance under the following heads:—

1. The *drum drinker*, who has been already referred to.
2. The *occasional drunkard*, who may get drunk at a fair or festivity several times a year, being temperate in the intervals.
3. The man who has violent outbreaks of intemperance *at long intervals*, which may last a week or month, and then subside into temperance or even abstinence.

He says:—"For none of these classes can we find a place in Life Assurance. All of them are among the most dangerous risks which are offered to us, and no money compensation can be put against the chances of such a life breaking up suddenly. . . . A man with an injured valve in his heart, or a portion of his lung diseased, or with albumen in his urine, may outlive all calculations, but a habitual drinker to excess, never."

In the chapter from which the above are extracts Dr. Pollock has treated the question of intemperance in its bearing upon Life Assurance in a most practical manner, and has shown the great risk undertaken by a Company when insuring lives of intemperate habits. Not only must the present habits be taken into consideration, but also the past habits. It is seldom that we find a reformed drunkard or a Keeleyite who does not at some later date again break out into intemperance. Reclaimed drunkards are therefore not desirable risks.

Disastrous as intemperance in the use of intoxicating liquors is

to the health, a *moderate* use of stimulants does not, to any extent, tend to shorten life. By *moderate* is meant stimulants taken in small quantities with the meals, and not more frequently than twice in the day. It is, therefore, not so much the use as the abuse of intoxicating liquors which is injurious, and it is the medical referee's duty to distinguish between them. Use may in time lead to abuse, and too great care cannot be exercised in drawing the dividing line.

Dr. Charles L. Greene says, with reference to intemperance and the insurability of intemperate lives:—"Generally speaking, a man who regularly takes his stimulant four or five times a day is hardly to be considered a first-class risk, though his age, nationality, family history, occupation, environment, general reputation, and the time and manner of indulgence must always be considered."

Before leaving this question of habits, I will take the liberty of quoting from some remarks made by Dr. Thorburn of the North American Life Insurance Company, which treat with the other side of the question. He says—"I would not consider a teetotaler or a vegetarian a good risk simply on account of habits, no matter how regular and proper he may be in his course of life, for it not infrequently happens that such are compelled to regulate their mode of life on account of physical or mental weaknesses. . . . The temperate man is the most desirable risk for the Company."

Consideration must now be given to the
 5. Important remaining facts relating to the life brought out
 Diseases. by an enquiry into his family history and personal history, and by a thorough physical examination. This part of the subject can, I believe, be best treated by taking up separately the more important diseases to which flesh is heir, and by showing what value is to be placed in each case upon family record, upon personal history, and upon physical condition in estimating the value of the life from an insurance standpoint.

(1) *Phthisis*.—The great prevalence of this dread disease and the high rate of mortality incident thereto makes its study one of necessary interest to Life Assurance Companies. Assurance Company officials have gone deeper into this question than perhaps any other, and the reports upon the investigations which they have made with regard to this disease would fill many volumes. In this paper it is possible only to summarise the

results which have been brought out by the more important of these investigations.

Phthisis is admitted as being a hereditary disease; that is, the tendency to phthisis is hereditary, and thus, in arriving at the probability that any life proposing for assurance will develop this disease, a history of the applicant's antecedents is essential. By considering the family history alone, however, a proper value of the life cannot be arrived at. The physical condition of the applicant, such as his weight, chest measurements, general build, muscular development, etc., must be given its due share of attention.

Perhaps the most valuable report on this subject, based upon actual experience, is that by Dr. E. J. Marsh, Medical Director of the Mutual Life Insurance Company of New York, prepared by him in 1895. The material made use of by Dr. Marsh in the preparation of this report consisted of 22,085 cases, being the entire mortality in his Company during the fifteen years from 1879 to 1893. This number of cases appears comprehensive enough to afford significant results. I give below a Table extracted from this report, which seems to show the marked difference between the mortality from consumption in families having hereditary taint and in families without hereditary taint:—

Age at Insurance and Cause of Death.		Non-Consumptive Patients.	Consumptive Families.
To 29 years	All Causes ...	473	255
	Consumption ...	135	96
	Percentage ...	28·5	37·6
30 to 39 years	All Causes ...	903	674
	Consumption ...	120	136
	Percentage ...	13·3	20·2
40 to 49 years	All Causes ...	813	59
	Consumption ...	54	55
	Percentage ...	6·8	9·2
50 years and upwards	All Causes ...	517	469
	Consumption ...	24	23
	Percentage ...	4·6	4·9

In commenting upon this Table, Dr. Marsh writes:—"It would appear from this Table that the importance which has been attached to a family record of consumption is not modified by the age of the applicant; for the influence of this taint is shown as clearly in persons between forty and fifty years as in those between twenty and thirty years of age"; and further, "from these figures it is evident that a consumptive family record is of considerable value as indicating an increased liability to consumption in an applicant, and that the amount of this increased liability may be estimated at thirty per cent. This estimate holds good until the age of fifty years is reached, after which age no difference is apparent between the classes." An investigation was also made by Dr. Marsh to find out whether favourable personal conditions might not equalise or even overbalance unfavourable conditions of family predisposition. This investigation resulted in the conclusion that, as far as the Mutual Life's experience went, the family history had influenced the consumptive death-rate far less than had the personal condition.

The following conclusions were arrived at by Dr. Marsh as a result of this investigation:—

- (1) That the history of consumption in any member of the immediate family increases the probability of its appearance in an applicant.
- (2) That consumption in a brother or a sister is at least of equal importance as when it has occurred in a parent.
- (3) That persons who are under the standard or average of weight are much more liable to consumption than those above the standard. That the peculiarity of constitution which is indicated by the inability to take and assimilate a proper amount of nutriment, indicates a susceptibility to phthisis, or at least is a reasonable suspicion of such predisposition.
- (4) That persons who exhibit a robust and well-developed body have little susceptibility to consumption.
- (5) That the personal condition of weight and robustness has far more value than the family history in diminishing the liability to consumption; therefore,
- (6) The evidence presented by a well-developed body may outweigh the suspicion attached to unfavourable family record.
- (7) That these influences of family history and personal weight are of the same grade for every age, and their importance is not lessened by the fact that the individual has reached middle life.

Dr. Marsh, in concluding his report, gives the following advice:—"In deciding upon the eligibility of an applicant for Life Insurance, in whose case there is a suspicion of future danger from consumption, his personal condition is of the first, and his family record of the second importance. Whenever he presents a robust appearance, with a weight at least equal to the standard or average, he may be accepted, notwithstanding any taint in the record of his family. . . . If, however, his weight does not come up to the average, and he gives a history of consumption in brothers, sisters, or parents, he is to be regarded as an unfavourable risk. This does not mean that all such persons are to be absolutely excluded from insurance, but each case must be carefully scrutinised, and the decision based upon the circumstances of occupation, character, past history, etc. When these are favourable, insurance should be given on terms most advantageous to the Company, by limiting the amount or modifying the form of policy; when unfavourable, the applicant should be either postponed until he has gained sufficient weight, or else be absolutely rejected."

Dr. Charles L. Greene, in his masterly work, "*The Medical Examination for Life Insurance*," gives some very valuable information with reference to the subject of tuberculosis. He states, with reference to the size of the family, that it is evident that the applicant's liability to inherited taint varies inversely as the ratio of healthy to infected family members, and he considers that considerable importance should be attached to the resemblance which the applicant bears to the deceased family members. That hard muscles, a sound heart, freely expanding lungs, and good blood render their possessor to a certain extent immune to phthisis is, he says, beyond question, but that it is more than doubtful that the physically sound member of a consumptive family is as safe a risk as the healthy man of untainted stock. With reference to exposure to infection, Dr. Greene writes:—"Dampness, foul air, lack of sunshine, all favour the development of tuberculosis, and predispose the individual to infection. . . . Curiously enough, despite the well-known infectivity of tuberculosis, Insurance Companies have, until quite recently, failed to inquire as to the applicant's association with consumptives. As a result of this omission Companies have insured thousands of men exposed daily in their own households to infection through their wives or children. Such might appear

as excellent risks with a clean family history, and yet be far more dangerous to the Company than others whose family history was such as to have caused their rejection."

This last statement of Dr. Greene's shows how necessary it is that Companies should make close inquiries as to liability to infection, and it appears as if Companies are beginning to recognise this necessity by inserting in their blanks questions designed to bring out the state of health of the different members of the applicant's own family, his brothers and sisters, if he is single, and his wife and children, if he is married. Some Companies now also ask particularly whether or not the applicant has lived with, or been in close contact with, anyone suffering from tubercular disease. This latter question, it would appear, is very necessary, especially when we consider the difference in opinion which exists as to the relative importance to be placed upon hereditary predisposition, as brought out by the family history, and liability to infection, when forming a decision regarding the insurability of a life.

In a paper read before the Insurance Institute of Yorkshire, England, in 1902, W. M'Gregor Young, M.A., M.D., gives as his opinion that contagion has much more to do with tubercular disease than has generally been admitted. He says:—"I am sure that the more statistics one examined, the more will it be found that contagion has played a large part in furnishing the apparently irrefragable statistical proofs of family predisposition. Moreover, the widespread nature of the disease makes any argument fallacious which would prove hereditary predisposition from a study of the statistics of the cause of death in the ancestors of any individual." Dr. Young, after giving a history of a remarkable case which came before Professor Ruata, thus concludes his remarks regarding the disease:—"Professor Ruata asserts that on the first discovery of symptoms of consumption a careful inquiry will reveal a clear history of prolonged contact with a phthisical person, for 2, 3, 4, or even more years, and that his case book shows such a record in ninety per cent. of all such cases. To sum up, while not asserting, as matters are, that family predisposition is a mere bogey of a 'negligible quantity,' as Villemin puts it, yet it is very evident that, from the Life Assurance point of view, the whole matter requires the strictest revision, or even revolution, as to the weight to be attached to it in rating any candidate for insurance."

I quote from Dr. Young's paper merely to show that a difference in opinion does exist upon the subject. I believe, however, that, as yet, the majority of Life Assurance officials have not been converted to Dr. Young's opinion, but still hold the ground that hereditary predisposition is a very important factor to be reckoned with; in the medical world, however, opinion in this regard appears to be changing.

Dr. P. S. Donnellan, in a paper on "Heredity," states that since Koch's brilliant discovery of the tubercule bacillus as the undoubted exciting cause of phthisis, the views of pathologists and physicians regarding the disease have undergone a complete change. Before the time of Koch it was generally held that phthisis was of undoubted hereditary origin. In conclusion Dr. Donnellan says:—"It is reasonable to suppose that the medical directors of Life Insurance Companies, will, in the future, be inclined to attach less significance to the hereditary factor in the production of phthisis than has been the case in the past. It would be of the greatest importance in deciding the case of an applicant in whose family history there were one or more deaths from phthisis, were the medical examiner to place himself in possession of some definite information as to whether the disease was contracted prior or subsequent to the birth of the applicant, or, in other words, whether it was a distinctly hereditary disease or an acquired disease, in which latter case the medical director at the home Office would give applicant the benefit of the doubt."

In July of 1899 a most interesting and instructive paper touching upon this subject was read before the Insurance Institute of New Zealand by Mr. J. H. Richardson, F.F.A., A.I.A., Vice-President of the Institute. Mr. Richardson, after considering at some length the different opinions expressed by well-known authorities, such as Messrs. Pollock and Chisholm, Mr. H. W. Manly, F.I.A., Dr. Thomas Glover Lyon, Mr. N. B. Gunn, F.I.A., F.F.A., and Dr. E. J. Marsh, gives the following as the conclusions which he has arrived at:—

- (1) That consumption is of a markedly hereditary character, and that a history of consumption in any member of his family increases the probability, in certain circumstances, of its appearing in an applicant.
- (2) That no general rules can be laid down as to the practice that should be followed in individual cases, but that

each case should be considered on its merits, bearing in mind :—

- (3) That double inheritance induces earlier disease and of a more rapid form; that heredity appears to influence both sexes equally; that atavism frequently occurs, a whole generation being skipped; that we derive important indications from the examination of the history of collaterals, as well as of ascending generations; that for all practical purposes it makes little difference whether the consumption has occurred in the mother or the father; that it appears to be doubtful as to whether the deaths of the parents or brothers and sisters exercise the greater influence, but that in either case the significance is serious; that a family history exhibiting two or more consumptives is more significant than a record of a single case; that family history would appear to influence the consumptive death-rate far less than does the personal condition, and that therefore it is a less valuable indication of underlying phthisical predisposition.
- (4) That personal physique and weight are more important than family history; that persons with poor physique, but without any hereditary tendency to consumption, are more likely to die of consumption than persons with a hereditary tendency and a good physique and weight; that a slight excess of weight almost neutralises a consumptive tendency, whilst the combination of a light weight with a hereditary predisposition to consumption gives a high mortality; that even where there is no hereditary taint those above the average weight are less consumptive than those below, body development being of very great importance in indicating the absence or presence of a phthisical predisposition.
- (5) That the age of the life is a material point for consideration, especially as to whether he has passed the age at which his relatives died, the impression among medical men being that lives which have lived longer than a relative who has died from consumption are better than those who have not done so.
- (6) That any history of hæmoptysis or other lung affection such as asthma, cough, or catarrh, or where there are traces of former lung mischief, is of serious import; in connection with hæmoptysis, it should be remembered that the risk of death seems to gradually decrease with the lapse of time since the occurrence of the event, and that cases of comparatively recent occurrence should be deferred until a long time has elapsed without a recurrence, and the life is in other respects good.
- (7) That child-birth, change of life, exposure, grief, fever,

and general debility in the mother or some other member of the family frequently mean consumption, although, of course, child-birth does include cases of death from child-birth where a delicate or consumptive constitution may have nothing to do with the matter.

- (8) That environments and habits exercise considerable influence in inducing consumption where there may be a personal or hereditary predisposition—e.g., the occupation of a miller, in which considerable dust is inhaled, may be a material factor in inducing the disease; a youth may be exposed to infection from brothers and sisters already affected; dissipation may be the irritating cause which starts the affection, which under other circumstances would be escaped; poverty and the inability to purchase the comforts of life may exercise a similar effect. As showing the effect of occupation on the phthisical death-rate, I may here mention that Dr. Theodore Williams says that of nearly 6000 cases admitted into the Brompton Hospital during 10 years, two-thirds had indoor occupation.

In summarising these conclusions Mr. Richardson gives the following as points specially requiring consideration in dealing with lives in which the consumptive element is involved:—

- (1) The age of the proponent.
- (2) Whether the physique is good or bad, and the weight above or below the average?
- (3) Whether either or both of the parents have died of consumption or of some disease that may fairly be ascribed to consumption, and if so, at what age?
- (4) Whether any of the brothers and sisters have died of consumption or some like disease, and if so, at what ages?
- (5) Whether any of the grandparents have died of consumption or have died early of some suspicious cause, and if so, at what ages?
- (6) Whether father, mother, husband, wife, or any brothers or sisters are delicate or suffering from any form of disease, and if so, what?
- (7) Whether there has been any history of lung trouble or any kindred affection in the proponent, and if so, its nature and when it occurred?
- (8) Whether the occupation and environment are such as under ordinary conditions would be likely to promote longevity?

The conclusions arrived at by Mr. Richardson, based, as they are, upon the opinion of some of the most reliable authorities in the Assurance and medical world, are, I believe, well founded and

cover the subject most thoroughly. In estimating the value of a life from a phthisical standpoint, as it were, consideration must be given to not only the family history but the personal history, the physical condition, and the environment and occupation of the applicant. To all of these has Mr. Richardson referred in his paper.

The space given to the subject of phthisis in this paper may appear to be out of proportion to the size of the paper, but considering the heavy mortality from this disease, and its great prevalency, I think the subject deserves special attention. When once launched forth into a discussion of this question, the field of discussion becomes so large and the subject so interesting that it is difficult to turn to other fields. Before going on, however, I wish to point out the great importance which attaches to the use of the thermometer and to the taking of the pulse-rate in indicating signs of the approach of this disease.

In an extremely valuable work Sequin writes as follows:—“During tubercularisation all the signs expected from the keenest recourse to physical diagnosis may be silent, whereas thermometry will give out positive evidences of the consumptive process,” and further, that “The temperature is a more accurate indication of the amount of tuberculosis and tubercularisation than either the physical signs or symptoms. By means of the thermometer we can diagnose tuberculosis long before the physical signs and symptoms are sufficient to justify such diagnosis.”

Dr. C. L. Greene, who has previously been referred to, also holds the same view. He writes:—“A slight daily rise in temperature is now universally recognised as a symptom of great importance. . . . Why life insurance companies have not more generally recognised the importance of this symptom is a difficult matter to understand.”

With reference to the pulse rate, Mr. Frederick L. Hoffman, Statistician to the Prudential Insurance Company of America, in a valuable paper contributed by him writes:—“The pulse rate is another means of early diagnosis which, to my knowledge, has been but imperfectly developed in life insurance examinations. As Greene has pointed out, ‘a rapid pulse is a very constant feature in incipient tuberculosis, and should suggest the propriety of determining the temperature of the applicant;’ but a still more

* “Industrial Insurance and the Prevention of Tuberculosis.”—Prepared for the British Congress on Tuberculosis, 1901.

important fact is that, to determine the pulse rate, note must be made whether the applicant was sitting or standing, and the observation must be at least the mean of three, taken for half a minute each. My investigations into this branch of my inquiry have confirmed the view of Professor Gould, that most statements as to the rate of the pulse are unreliable and useless, giving strong evidence of guess-work multiplied by four."

(2) *Cancer*.—Cancer, while very deadly in its character, is not by any means as prevalent as consumption, and therefore does not demand so much attention by life assurance officials. With regard to this disease it is impossible to form very definite opinions, in view of the fact that the knowledge of the pathology of cancer possessed by medical men is, at the present time, undergoing a process of rapid evolution.

It is usually conceded that the disease is hereditary. Dr. Pollock, in his "Medical Handbook of Life Assurance," states that it is hereditary in one-third to one-seventh of the cases; that it has a tendency to reproduce itself in the same organ as in the case of the parent; and that it is most prevalent between 40 and 60. Dr. Pollock advises to reject the issue of two cancerous parents, especially if the disease has shown itself in other members of the family, but is of the opinion that a healthy person at 30 to 40, whose one parent had cancer, might be accepted.

In the case of cancer, the risk, if assumed, is an increasing hazard. The granting of a short term endowment assurance would therefore appear to be well adapted to this class of risk.

The Specialised Mortality Investigation by the Actuarial Society of America gives the following results with reference to those who have had any near relative die of cancer:—"Good on young entrants, almost equally good on mature entrants, fairly good on elderly entrants, but not good on old entrants."

(3) *Rheumatism*.—In the case of rheumatism, it is essential that sufficient data be furnished to the medical referee before a decision can be arrived at. Where the applicant has had rheumatism, information should be obtained as to the particular form of the disease from which he has suffered, the date of its appearance, the joints affected, the duration of the illness, the presence of heart complications, and the applicant's susceptibility to rheumatic attacks of any kind at the time the application is made. According to Dr. Greene, one attack of inflammatory rheumatism should call for a postponement of at least two years and for a

period of complete immunity from all rheumatic symptoms, and repeated attacks should call for the rejection of the risk or special rating. If the family history showed a decided rheumatic taint, or if the occupation and environment were such as to favour the incidence of rheumatic attacks, it would be better to grant endowment assurance only, even if the applicant has suffered from but one attack.

Dr. Greene also considers that the term of postponement should vary directly with the severity of the attack, and thinks it would be well to inquire whether any surgical treatment was necessary. Minor rheumatic affections, if remote and infrequent, do not, in his opinion, affect insurability, if family history and occupation be favourable.

Rheumatism is a hereditary disease, and is closely associated with heart disease. Where the applicant has had an attack of rheumatism it is therefore most important that a careful examination of the heart be made.

The Actuarial Society of America, in their Specialised Mortality Investigation, gives the experience with regard to two classes having a rheumatic history, Class 47 comprising those who had had inflammatory rheumatism once before entrance, and Class 48 those who had it oftener than once. Both of these classes showed good results upon young entrants, and Class 47 showed good results for mature entrants. The other groups were not quite satisfactory. On the whole, Class 47, which was much the larger, had done well except as regards old entrants, while Class 48 had not been satisfactory except as regards young entrants.

(4) *Gout*.—Gout appears to be a disease which is much more prevalent in Great Britain than on this Continent, and consequently it is not often encountered by the examiner. With English Companies the practice appears to be to grant endowment assurances maturing at age 50 or 60, or to grant a whole life assurance, rating the age up five years. It is generally believed, however, that this addition of five years to the age is entirely inadequate to meet the increased risk. Dr. E. J. Marsh, Medical Director of the Mutual Life Insurance Company of New York, made in 1895 a very careful investigation of the mortality from this disease, and after giving the experience of his own Company and a number of quotations from medical authorities bearing upon this subject, Dr. Marsh concludes his report as follows:—

“The rule of the Company’s practice should be, as it has

hitherto been, that such persons are uninsurable at ordinary rates and on the plain life plan. If exceptions are made to the rule, they should be fewer, and made with more discrimination than hitherto. In every case the presumption is against the acceptance of an applicant who has had gout, and the case must be proved to be suitable for an exception, after more than ordinary scrutiny and investigation. The cases which might form such exceptions cannot be defined, and each must be individually decided by the responsible medical adviser of the Company, but I think they should be limited to the following :—

- “ 1. There should be an entire absence of hereditary tendency.
- “ 2. The first attack of gout shall not have appeared before 30 years of age.
- “ 3. The attacks shall have been very few in number and slight in character, and that several years shall have elapsed since the last attack.
- “ 4. That the person shall not have had gravel, frequent uric acid deposits in the urine, or symptoms of lithæmia.
- “ 5. The habits must be abstemious, both in eating and drinking, and the applicant must have given evidence that he appreciates the necessity of this course of life.”

The Specialised Mortality Investigation brings out the following results with reference to those with a history of gout :—

“ Class 49, those showing a record of gout, exhibits results which are seriously disappointing to those who had hoped that earlier adverse reports on this class of cases might be overborne by wider and later experience. The mortality on this class is only slightly excessive within the first five years of insurance, but is afterwards nearly double the expectation.”

(5) *Insanity*.—Insanity is another of the hereditary diseases. No person who has been even temporarily insane should be granted insurance at ordinary rates. According to Dr. Pollock, about one in three or four cases have had a parent or parents insane, and an accumulation of heredity in several ancestors is almost certain to induce the disease. With reference to the insurability of applicants having an hereditary taint, Dr. Pollock writes :—“ It is difficult to lay down rules, but we might say that the issue of one insane parent might be accepted if 35 to 40, and without any nervous affection. If his brothers or sisters have been affected the case is more than doubtful, but perhaps a considerable addition to the premium might compensate the risk.”

(6) *Apoplexy*.—According to Greene, apoplexy is one of the most strikingly hereditary of all diseases, and inasmuch as its incidence depends upon degenerative processes in the blood-vessels, it at once becomes evident that with it must be considered such associated or alternative conditions as arteriosclerosis, chronic Bright's Disease, particularly interstitial nephritis, aneurysm, and, to a less extent, heart disease. In the case of apoplexy the tendency is for the family members to die in middle age, consequently such a risk, if accepted, becomes an increasing hazard, and a short term endowment assurance might very well be granted.

(7) *Asthma*.—Asthma is also classed by some among the hereditary diseases. According to Dr. Pollock, an applicant may be accepted with an asthmatic parent if he has never had exzema, rheumatism, or gout, has a well-shaped chest, and is between 30 and 40. If both parents were asthmatic, or grandparent and parent or other member of the same generation, he thinks an extra should be charged. Wherever the applicant himself has suffered from asthma the usual practice is to decline to grant insurance or to grant a policy on a short term endowment.

Dr. E. J. Marsh, who has before been referred to, in a report on this disease, states that, in his Company, a history of asthma in an applicant has always been considered as incompatible with his acceptance as a satisfactory risk, but that on reviewing the question he considered that this rule had been too rigorously enforced, and might be made to admit of some exceptions.

He says:—"If the patient is young, the chest sound, the attacks short, the intervals long; if there is no permanent shortness of breath, no cough or expectoration; if the attacks are getting milder or rarer, and if the existing cause is clear and such as may be obviated, then a favourable prognosis may be given."

He advises, however, that approval of these exceptional cases should only be given when the applicant is otherwise perfectly sound and free from flaw in his family and personal record. If there be even a slight tendency to over-weight, gout, or any other nervous affection, as headache or other neuralgia, he should not be accepted.

(8) *Heart Disease*.—In the detection of the presence of any form of heart disease in an applicant, the Company has to depend solely upon the physical examination made by the medical

examiner. In this examination the examiner should make a thorough examination next the skin, and in the usual manner to determine if any abnormality in the heart's action exists.

Should any marked irregularity or intermission of the heart action be discovered, the rule should be to refuse to grant assurance, as these cases are very subject to the accidents resulting from weak heart.

Where we find a trembling but forcible and struggling heart-beat, the value of the life for assurance purposes will depend on the degree, the duration, and the cause of this abnormal condition. Such cases need not be declined outright; some are safely assurable if an extra premium is charged to compensate for the extra risk.

Intermission of pulse in its simple form, unaccompanied by marked irregularities, may not be of grave importance, and its presence should not be an obstacle to assurance at ordinary rates. According to the results of the Specialised Mortality Investigation, those who have been accepted for insurance, notwithstanding an intermittent or irregular pulse, have proved themselves to be good risks when insured at the younger ages, but not so good when insured at the older ages.

A life with an aortic murmur, systolic, diastolic, or double, is uninsurable.

With regard to mitral murmurs, Dr. Pollock states that the rule of Assurance Companies has hitherto doubtless been to reject all such lives as present any form of mitral murmur, and they are certainly uninsurable at anything like the ordinary rates.

Quoting from Dr. Pollock, in concluding:—"It remains to say of heart cases that the most dangerous are those indicating failure of power and muscular tone, and that the aortic cases are much more perilous than the mitral, the former being, in our judgment, ineligible at any rate which may be assigned to them, while it may be possible to compensate the increase of risk in the latter by additions in some form to the premium."

(9) *Appendicitis*.—According to Greene, "appendicitis," in an application for insurance, masquerades under many disguises. Among these are "stoppage of the bowels," "bowel trouble," "constipation," "inflammation of the bowels," and "colic." "Peritonitis," as all medical men know, means, in a vast majority of cases, either disease of the female pelvic organs or appendicitis. Wherever such obscure or indefinite terms are made use of a

careful investigation should be made to arrive at their true meaning and significance.

Dr. Albert Wood, Medical Director of the State Mutual Life Insurance Company of Worcester, has made a very thorough investigation of this subject, and has given some very valuable rules governing the acceptance of lives showing a history of appendicitis. The rules he gives may be briefly put as follows:—

1. Applicants who have suffered from acute non-suppurative appendicitis (*appendicitis obliterans*), the appendix not having been removed, are safely insurable after two years of complete immunity.
2. Applicants who have had the same form of the disease, but from whom the appendix has been removed, may be insured after one year of immunity—it being assumed in all cases that no bad effects have been experienced subject to operation.
3. An applicant who has had suppurative appendicitis followed by removal of appendix by operation, or in whom simple drainage has proved sufficient, may be accepted after two years.
4. When the abscess has ruptured internally and emptied through the bowel, Dr. Wood would lay down no definite rule, but would act upon the facts presented by each individual case.
5. In chronic relapsing cases, a period of from three to five years, dating from the last attack, should be allowed to pass before accepting the risk.
6. In cases complicated by general peritonitis, postponement for one year is recommended, if recovery has been prompt and complete and the appendix has been removed. If not removed, a period of three years of immunity is demanded.

In commenting upon these rules, Dr. C. L. Greene says:—
“The foregoing rules should be considered the most liberal that could be adopted, and as a matter of current practice the terms of postponement are made somewhat longer. Age should also be considered, as a majority of cases occur under the age of forty years.”

I should consider Dr. Wood's rules, backed up, as they are, by the opinion of Dr. Greene, as most suitable for the guidance of Companies in their treatment of risks of this nature.

(10) *Other Diseases of Respiratory Organs.*—We have already referred to phthisis and asthma, the most important of the diseases of the respiratory tract. Of the remaining diseases pleurisy and

pneumonia are the most important. With reference to pleurisy, Dr. Greene states:—"Pleurisy is under grave suspicion at the present time, and it can be said with some emphasis that a large percentage of true pleurisies are tuberculous." Some French writers place the proportion of tubercular pleurisies as high as 70 or 80 per cent. In the case of applicants with a history of pleurisy, a long period of postponement after the last attack or a special rating is advisable. The period of postponement will depend largely upon the severity of the attack. In those cases where pleurisy is complicated with empyema, it is doubtful whether they can ever be safely granted a life policy at lowest rates. The proper course to follow, however, will depend much upon the cause, duration, promptness of recovery after operative interference, and the result as shown by the condition of the lung at the time of examination.

In the case of pneumonia, if the attack has been recent the application should either be postponed or accepted at a special rating. If the disease is recurrent, a short endowment is all that can be safely granted.

(11) *Diseases of the Digestive Tract.*—Of these diseases we have already considered appendicitis, perhaps the most important of this group. Of the other diseases in this group the following should disqualify:—Hematemesis, gastralgia with vomiting, hydatid cysts, obstruction of bowels, and ascites.

Dyspepsia, if not in its severe form, is unimportant; but severe chronic dyspepsia is a bar to insurance save under special rating. In connection with dyspepsia it must be remembered that in the applicant's vocabulary the term "dyspepsia" may be used when the disorder is of a more serious character, such as "Bright's Disease," "gastric ulcer," "tuberculosis," "cancer of the stomach," and many others. Care should therefore be taken to first find out whether, when the term "dyspepsia" is used, the disease dyspepsia is meant or some other more serious disorder.

An occasional attack of simple diarrhoea or acute dysentery need not affect the insurability of a life, but, where chronic diarrhoea or dysentery exists, insurance of the cheaper kinds cannot be granted.

Whenever an applicant presents a history of colic, sufficient information should be furnished to enable the Company to determine the exact nature of the trouble and its effect upon the life. According to a well-known authority, any recent paroxysm of

abdominal pain, unless unequivocally due to simple acute indigestion, demands postponement, and recurring attacks of whatever sort must be met by postponement, or, if thought to be due to grave ailments, by special rating or actual rejection.

Tumour of the liver, or inequalities of its surface when enlarged, should cause declination, as they may mean cancer, cirrhosis, or hydatids. Mesenteric tumours, fibroid, scrofulous or malignant, should also cause an unfavourable decision.

A history showing past attacks of typhlitis or perityphlitis should disqualify in most cases, unless some years have elapsed, when a more favourable view might be taken.

Fistula, if in existence at the time of application, should cause postponement until entirely cured.

The existence of piles, if at all severe, will necessitate postponement until a cure is effected.

In cases where hernia exists, Dr. Greene states that if the applicant be an intelligent man, engaged in some sedentary occupation, even a double hernia, if properly retained, need not unfavourably affect the risk, and that he would generally prove a better subject than the labouring man with a single hernia. Some Companies, however, absolutely reject or demand special rates for double hernia. In all cases of hernia the Company should protect itself by inserting a clause in its policies stipulating that one of the conditions upon which the insurance is granted is that a suitable truss be worn continuously.

(12) *Diseases of the Genito-urinary Organs.*—The diseases of the genito-urinary organs are among the most important of those which affect the value of a life. It is essential that a chemical examination, and, in the case of applications for large amounts, a microscopical examination of the urine be made. A man may be suffering from glycosuria or albuminuria and yet neither know it himself or show by his personal appearance any evidence of the disease.

Hematuria is always a serious affection from an assurance point of view. In cases where many years have elapsed since the occurrence, and where a complete recovery has been made, where the applicant is in perfectly good health and temperate, and where the trouble has not been traced to any kidney or bladder disease, the risk may be accepted with caution, and with some addition to the premium; but where there are any indications that the hematuria resulted from kidney or bladder disease, the life should be rejected.

Dysuria, due either to stricture of the urethra or to enlarged prostate, and existing to any considerable extent, would prevent acceptance. Many cases of stricture, however, are of a mild type, and do not seriously affect the insurability of the life unless where advanced in age.

Syphilis.—The effects of this disease upon the duration of life are very marked. According to Dr. Pollock, the assurance rules with reference to this disease are as follows:—During the actual existence of any syphilitic disorder the proposal should be postponed; if a proposer has had syphilis in the secondary forms, a small addition should be made to the premium, and the life should then only be accepted if two years have been passed since the last symptom. Dr. Greene, in his work before referred to, states that most Companies will insure syphilitics at ordinary rates if treatment has been efficient and a period of not less than five years has elapsed since the disappearance of all symptoms. Dr. Greene himself, however, is of the opinion that under no circumstance should a straight life policy be issued to any man who has had a syphilitic history, but that endowment insurance might be safely granted in many cases.

Dr. E. J. Marsh, after making an investigation into this disease, arrived at these conclusions:—

1. No case with a history of any primary venereal sore should be accepted until six months shall have elapsed after its first appearance. If, however, in the absence of all constitutional treatment, no other symptom, such as glandular enlargement, eruptions, mucous patches, may have appeared by this time, the applicant might be acceptable. If he has undergone any constitutional treatment, a further postponement of six months after the termination of such treatment is necessary.
2. No person with a history of syphilis is insurable until after a proper course of treatment, and the lapse of at least six years from the date of infection.
3. No person can be accepted who may have any history or evidence of tertiary manifestations.
4. On the other hand, a person may be accepted who gives a history of constitutional syphilis, provided the original disease may not have been very severe, that he shall have undergone a prolonged and satisfactory course of treatment, and a period of six years may have elapsed since the initial lesion, during the last two of which no relapses have appeared, and no tertiary symptoms at any time.

It would therefore appear that there is some difference of opinion as to the treatment of these cases, especially as to the period of postponement. The course outlined by Dr. Marsh would seem to be safe and yet not too rigorous.

Albumen is found in several chronic affections of the kidney, and also in acute nephritis. It is often present, also, in the acute inflammatory affections—rheumatic fever, scarlatina, pneumonia, typhoid—but in these cases is only temporary.

With regard to the question of albuminuria in Life Assurance, George Johnson, a man whose opinion should have weight, says:—"No prudent medical officer would advise that a proposed assurer with a trace of albumen in his urine should be accepted at the ordinary rate of premium." This, however, is a rather cast-iron rule, and might, if applied, exclude risks which were properly entitled to insurance.

Dr. Pollock, in his "Medical Handbook," gives the following rules, which appear to be more practical than that of Mr. Johnson:—

1. Albuminuria formerly existing as a result of acute nephritis, from cold or exposure, with an interval of perfect health for years, need not disqualify a proposer. The same may be said of scarlatina.

2. Albuminuria presently existing and known to have existed for years in persons of otherwise perfect health, and good family history, may be assured for a short period of, say, five years with an addition to the premium, and come up again for examination at the end of that period.

3. Albuminuria with any of the symptoms of chronic Bright's Disease, with any alteration of cardiac sounds, or with gout, rheumatism, or any constitutional affection, or any suspicion of intemperate habits, should be declined.

Diabetes is indicated by the presence of sugar in the urine, but in all cases where sugar is present diabetes does not necessarily exist. The mortality from this disease increases with age up to sixty or seventy years, and males are twice as liable as females.

It is difficult to measure the duration of this disease, as its progress can be much retarded by the adoption of dietetic measures on the part of the person suffering from it, but, on the whole, the prognosis is bad. There is a liability to phthisis, cerebral affections, anthrax, and other fatal complications which renders anyone affected with the disease ineligible for assurance.

In other cases where sugar is found in the urine there should be a postponement until it has disappeared.

Whenever pus or bile is found in the urine the risk should not be accepted. Pus indicates a serious disease of the kidneys or the bladder, and bile suggests liver trouble.

The presence of phosphates is unimportant.

Renal and Biliary Colic and Calculus.—In connection with these diseases it might be interesting to refer to a report made by Dr. E. J. Marsh as a result of some of his investigations. Previous to the date of this report, the rule of Dr. Marsh's Company, the Mutual Life of New York, had been to require a postponement for five years where there had been a history of one attack, the period of postponement dating from the date of the attack, and, where there had been two attacks, to absolutely refuse to grant insurance. Dr. Marsh, after going into the question fully, advised that the rules of the Company with reference to applicants with a history of gravel or gall-stone be modified, so that, under favourable circumstances,

1. One attack should call for postponement of two years only ;
2. Two attacks, postponement for five years from last attack, provided that the applicant during all this period be in perfect health, with nothing pointing to a recurrence of the disease, and that he be of good physique and of active and temperate habits. If, however, there be any tendency to accumulation of fat, any dyspepsia, biliousness, deposits in urine or other symptoms of lithæmia, the slightest gouty tendency, habitual excess or indiscretion in diet, he should be either altogether rejected or postponed for at least double the period mentioned.

(13) *Diseases of the Nervous System.*—One of our insurance authorities has stated that every case of hemiplegia or paralysis, however remote, makes its possessor ineligible for life insurance, but Dr. Greene thinks this statement too sweeping. Infantile paralysis from which a partial or complete recovery has been made ought not to debar an applicant from insurance if the locomotory organs have not been greatly interfered with.

Epilepsy is distinctly hereditary. The disease can be transmitted from ancestors, the parents having been free, and alcoholism in ancestors makes the predisposition more marked. The liability to inheritance, however, is lost about age thirty-five or forty. Those under that age with an hereditary predisposition should be rejected unless the personal history of the

applicant and that of his brothers and sisters is good, when they might be accepted with an extra premium or with a lien on the policy.

Where the applicant himself has had epilepsy, not of hereditary origin, a strict investigation must be made. He may have had but the mild form of the disease, and if years have elapsed without the recurrence of it, and if the applicant be over thirty years of age and has engaged in active work without any symptoms of nervous disorder, he may be accepted with a small extra, provided his habits with regard to the use of stimulants are strictly temperate. If he has suffered the more severe form of the disease he must be rejected, unless fifteen or twenty years have elapsed since the attack, during which time he has been in perfect health, and even then it is better to make an addition to the premium or limit the policy in some way.

Mania and Hysteria are two forms of nervous disorder which it is better to decline.

Vertigo, if of the severe kind, associated with the symptoms of Meniere's disease, and ending in deafness, should bring rejection, but where vertigo is only temporary and probably due to stomach disorder, the risk may be accepted.

The list of diseases and disorders which have been referred to in the preceding paragraphs cannot be considered as complete, but I believe the more important and the more prevalent diseases have been touched upon. It has been found impossible to treat with any of them at all thoroughly, and in most cases only the rules of selection, as given by some of the best authorities upon the subject, have been noted. It would require a wide medical knowledge and some experience in treating with applications to enable one to give each question its proper consideration.

Before bringing this paper to a close, two questions having an important bearing upon the insurability of life should properly be touched upon. These are the question of "Weight and Height" and the question of "Sex."

The weight of an applicant, taken in relation

6. **Weight and Height.** to his height and other measurements, must be given careful consideration in estimating the value of a life.

Most Companies accept lives whose weight falls between 20 per cent. under standard weight and 20 per cent. over standard weight. In some cases a larger margin than this is allowed.

In the case of underweights, there is a marked tendency to diseases of a tubercular nature, and such lives are looked upon with grave suspicion. Where we find an underweight with a chest well developed and well shaped, with a clean personal record, with no family taint of tuberculosis or other hereditary disease, and where light weight is found to be a distinct family characteristic, he may very safely be accepted, but it should first be clearly ascertained that the lightness is natural and not caused by any abnormal condition. In other cases underweights cannot be looked upon very favourably.

In the case of lives more than 20 per cent. over the standard weight, much variation exists in the practice of different Companies. The really dangerous risks in this class are the flabby, big-bellied individuals who lead sedentary lives, sleep and eat heavily, and have therefore a decided tendency to apoplexy and diseases of the heart and kidneys. If, in addition, we find a family history showing this class of diseases, the risk is still more hazardous.

In estimating over-fatness it is necessary to note what parts of the body are so developed. If we find well-developed chest and shoulders, with an abdomen moderate in circumference, not so much importance should be attached to the over-weight as if the person were corpulent and the abdomen large and pendulous. It should also be ascertained if the tissues are firm or relaxed and flabby; and the habits of the applicant as regards exercise, food, and stimulants should be closely inquired into. We usually find over-stout people flabby, often pale and with slow and feeble pulse, and with the heart action weak. Fatty degeneration of the heart and liver trouble may be looked for in obese persons; and antheromatous alterations in the coats of the arteries also occur and lead the way to their rupture, attended by hemorrhages. It is from this cause that many apoplexies occur.

For these and other reasons we cannot consider overweights, taken as a class, as desirable subjects for insurance. There are, however, some exceptions, such as a man who has been proved to be extremely moderate in his eating and drinking, especially with reference to stimulants, and who is mentally and bodily active, and who has come satisfactorily through a most searching examination. Such a life might very safely be accepted.

According to Dr. Greene, if a man be thick-set, hard, muscular and big-boned, his personal and family history above suspicion,

his habits temperate and his digestion good, his waist measurement less than that of his chest, he may safely be allowed a margin of from 25 to 30 per cent. above the tabular weight. Anything more should call for special rating or endowment policies.

Applicants who are full livers, large feeders, who take little exercise and whose occupation is sedentary, should be rigorously excluded.

It is only within recent years that Assurance

7. *Sex.* Companies have looked with any favour upon female lives as subjects for insurance. Many Companies followed the practice of charging an extra premium on female risks, and some still continue to do so.

Mr. Joseph A. De Boer, Secretary of the National Life of Montpelier, Vermont, in a paper on Female Lives, read by him in 1897, says:—"The business of life assurance has always distinguished between male and female risks because of

- (a) Difference due to mere sex;
- (b) Difference due to average environment;
- (c) The greater opportunity for the concealment of fraud;
- (d) The greater average want of insurable interest;
- (e) The more general difficulty of securing thorough examinations."

He goes on to say that if, through proper selection, the factor of moral hazard can be eliminated, it is reasonable to conclude that this special risk from sex is counterbalanced by an actual gain in the average quality of female insurance, because of reduced hazard from accident, nervous strain, and intemperance. The doubt about women lies in adverse self-selection and a greater probability that material facts can be and will more easily be concealed. To offset this doubt, careful inspection must be given, and insurable interest must be shown so clearly as to take the business out of speculation and make it safe.

Mr De Boer has given the following as the rules of the National Life with regard to selection of female risks:—

I. The following cases will not be accepted nor will medical bills therefor be allowed:—

- (a) Women under 20 years of age;
- (b) Women in pregnancy;
- (c) Women in lactation;
- (d) Married women until after birth of first child, or until five years after marriage.

II. The following cases will be considered doubtful and will invariably require an explanation of the point in doubt:—

- (a) Women applying for the benefit of their husbands ;
- (b) Women applying for the benefit of mere strangers ;
- (c) Women who are not self-supporting or in receipt of private incomes ;
- (d) Women over 45, who have not passed the period of menopause."

These rules seem to cover the ground pretty thoroughly, and further elaboration is almost unnecessary. The point of special importance in the consideration of applications from female lives is to see that, in every case, the beneficiary has an insurable interest in the life of the proposer—that is, that the beneficiary has an interest in the continuation of the life, and not in its termination. It would appear quite reasonable to assume that minor children have an insurable interest in the life of the mother, especially if dependent upon her for support ; also that an aged mother, or other close blood relation, actually dependent for support upon the life assured, has an insurable interest in that life. It is quite clear, however, that the husband has no insurable interest in the life of his wife, unless he is dependent upon her for support, or will suffer loss of property or money should she die. A woman has, however, a perfect right to effect insurance in her own favour, especially if she is self-supporting, and desires the insurance as a protection for old age.

It might no doubt appear from this paper that
8. Insurance of a large number of those applying for insurance
Sub-standard would be declined. As a matter of fact, Com-
Lives. panies do decline from five to fifteen per cent.
of applicants, while a large number of those
remaining are granted insurance only upon a modified form of
policy. Self-interest alone forces Companies to take unfavourable
action in connection with an application. To quote from Dr.
Greene :—

"All Insurance Companies would welcome any safe and equitable plan under which insurance might be granted along broader lines ; indeed, life insurance can hardly be considered as fulfilling its whole function when it offers protection only to the families of healthy men and fails to provide for those who, being dependent upon impaired lives, have much greater need of its benefits."

At the present time Life Insurance Companies, wherever possible,

endeavour to grant some form of insurance to the proposer, but often safety requires it to be upon such onerous conditions that the applicant declines to accept the policy. The insuring of sub-standard lives, as they are called, seems to be undertaken to a much greater extent now than heretofore, and probably to a greater extent in Great Britain than in this country. We may divide impaired lives into three classes :—

- (1) Those in which the risk increases with the lapse of years—"increasing hazard."
- (2) Those in which the risk diminishes with the lapse of years—"decreasing hazard."
- (3) Those in which the added risk is a constant factor—"permanent hazard."

There are several methods by which these increased hazards can be provided for :—

- (1) By arbitrarily charging an increased premium.
- (2) By advancing the age a number of years, which is practically the same thing.
- (3) By making the face of the policy liable to deduction in the event of death occurring within a stated period, the amount to be deducted diminishing as the age of the policy increases.
- (4) By using an endowment policy to cover the additional risk assured, and to limit the period during which such risk is assured.

It is unnecessary to go further into the treatment of sub-standard lives. It is a subject about which much has been said, and about which much yet remains to be said, and very little uniformity exists in the practice of different Companies at the present time. As a rule the Companies manage to keep on the safe side when considering an application from a sub-standard life, although often with a great deal of injustice to the individual applying.

With this brief reference to the insurance of sub-standard lives I will close. The development which has been made during the past half-century towards placing the business of insurance upon a more substantial basis has been great, and we hope for as great development in the future. Looking back to the time when the term "medical selection" was practically non-existent, we cannot but wonder how any of the Companies then doing business were able to survive the heavy death strain to which they must have been subjected. At the present time, with the advance that has

been made in medical science and in actuarial science, we are able to conduct the business of life insurance on a much more stable basis. We must not rest upon our oars, however. There is yet a vast amount of information to be derived from the experiences of different Companies which, if brought out by a carefully-directed investigation, should increase still further our knowledge and enable us, it may be, to see our way clear to confer the benefits of insurance upon lives at the present time considered uninsurable.

OBSERVATIONS ON MEDICAL EXAMINATION IN CONNECTION WITH LIFE ASSURANCE.

By BARCLAY J. BARON, M.B., EDIN.

*A Paper read before the Insurance Institute of
Bristol, February, 1904.*

MY only hesitation in accepting the invitation of your President to read a paper to you this evening arises from my feeling doubtful that I have any message to deliver that is worth your attention. I accepted your invitation, because I am always glad to show my appreciation of the good work that you are doing, in inducing people to save money for that best of all reasons, viz., in order to provide for their own old age, and what is further, for that of their wives, and, after death, to help their children. I know of no finer motive for saving, and I know of no body of men who are more deserving of the thanks of the nation at large than you Insurance men, who represent the great Institutions, without which we should be poor indeed. I don't say this to flatter you—that would be unbecoming—I say it in all sincerity, and it comes from a man who is a firm believer in Life Insurance as a solemn duty that is laid on every husband and father. And now that you are so progressive no one need say "I am worth more as dead meat than live cattle," because with the great fall in the rate of interest of all securities that are as secure as those which you offer, Life Insurance is, under certain policy conditions, a very good investment. Added to which is the beneficent arrangement, that should ill fortune overtake the Insurer, then he does not lose the benefit of his payments, but gets an absolutely fair settlement in a present or deferred payment.

The comfort and rest which a patient who is critically ill derives from the knowledge that he leaves his wife and family provided for, and that the money will be available immediately after death, is indescribable. This rest and peace has doubtless saved many a person who would otherwise have succumbed to disease, if, in addition to fighting the grim opponent death, he had been tortured by visions of the poverty of his wife and children.

All this, gentlemen, by way of preface to my remarks of a medical nature. The title of my paper has been purposely left vague, because it gives me a wide range of view of the question of medical examination.

I have had 20 years' experience of this side of medical practice, and I think that one has to learn how to examine candidates, to allow for the natural nervousness of some which may cause intermittent pulse, &c., and to allay it, to pin others down to tell a plain unvarnished tale. Because I feel sure that within the four corners of the queries of the report it is not always easy to get at the truth of past illnesses, and to elicit the full truth, and especially from either the very nervous or the very wary candidate. Some tact is requisite in examination, and so far as we send up a report to the Head Office that is reliable we need not necessarily treat all candidates as a surgeon in the services treats recruits.

I am very glad to find on looking through the medical report forms of a number of Offices, which your President kindly obtained for me for the purpose of this paper, that *ear discharge* is enquired into in most Offices, and I would venture to suggest that this is a most important question. It is, in fact, difficult to name any one defect in a person that may be more important in regard to the probability of living up to the prescribed age than this; I say "may be" advisedly, because when there is an ear discharge, the length of time it has been in existence, the character of the discharge, its appearance, odour, quantity, and the reason why there is a discharge at all so greatly varies. For instance, it may depend on a succession of boils, or on a chronic Eczema which affects only the skin and tissues of the outer ear, or it may, as is most often the case, be due to an affection of the middle ear with free exit from the drum, or again there may be extensive mischief in the middle ear involving the bone, with or without polypus growth; lastly, it may be, as in rare cases that have come under my care, due to Tuberculosis, and even Cancer. All this can only

be decided by a careful examination with suitable instruments, and I feel strongly that, knowing as I do how many cases of "ear discharge" go on untreated, and eventually affect the bone deeply, or even the membranes or structures of the brain itself, and need severe and often fatal operations for mastoid or brain abscess, Insurance Offices should get the opinion of a specialist on these matters where necessary.

Take another matter—the question of *hoarseness or alteration of voice*. I find that very few Offices mention this in their Schedule. "Affection of the throat" is too vague, and a man might quite honestly answer this in the negative who had had attacks, under certain circumstances, of hoarseness or altered voice. Now hoarseness is, in my experience, sometimes a most important symptom, because I have, on several occasions, been able to see on careful examination of the throat such appearances as made me suspicious of the existence of tuberculosis long before the most skilled ear could hear it in the lung, although it may have been really in existence a longer time in the lung than in the throat—this simply because the eye recognises mischief more quickly than the ear.

Old Syphilis often writes its mark indelibly on the throat in the shape of hoarseness.

Cancer. On several occasions I have been able to diagnose the existence of unsuspected cancer of throat by this symptom alone having led to my being consulted. More than once the patients have been exceptionally well built, healthy looking men.

Aneurism. Not long ago a gentleman consulted me for hoarseness; examination of his larynx revealed paralysis of one vocal cord as a cause of this symptom. This led me to go very carefully into his case, and X-rays revealed the presence of a very large aneurism in his thorax. Here not only I but a skilful physician were able to find, on minute examination of the lung, only the faintest signs of abnormality—so little, in fact, that I feel sure they would not have been discovered in the usual thorough examination of a case for insurance. Needless to say the life of such a person hangs, literally, on a thread.

Drunkards. Very rarely in my experience does a man confess to the taking of more than a very moderate amount of alcohol—that word *moderate* is even more blessed than "Mesopotamia." If, however, we get

some suspicion from the man's face and general bearing that moderation in his case means excess, as we insurance people understand it, then hoarseness *may come* in to help confirm our suspicions. Usually enquiry of a breezy, jovial, and apparently sympathetic character enables one to find out the truth. The drunkard can rarely win in a match of wit against wit with a trained sober man.

Next there is the great question of *heredity*.

As regards this disease, great change has come over our ideas of the effect of inheritance. It has been steadily declining in importance since 1882, when Koch discovered the bacillus. We find that there is no reason to believe that the disease is ever transmitted directly to children, because *post mortem* it has never been found in the bodies of still-born babies. In fact, with the possible exception of a new-born calf it has never been discovered in the bovine race though they are so prone to its ravages, although very many new-born calves have been examined to elucidate this point.

Tuberculosis we know to be an infectious disease, but like leprosy and syphilis it does not usually run a rapid course as most infectious diseases do. Its introduction is generally insidious and unnoticed, and months, years, and even decades may elapse before it leads to manifest disease. Poverty, child-birth, lactation, mal-nutrition, over-exertion, unsuitable hygienic surroundings are amongst the conditions which may kindle it into activity; we then have the beginning of phthisis, but the true beginning of the tuberculous infection is by no means coincident with this but dates far back "to the earliest period of childhood." (Behring, in *Brit. Med. Jour.*, October, 1903.)

Thus we have the rational explanation of "hereditary phthisis"; what really happens is that young children in contact with phthisical parents of careless habits ingest tubercle bacilli by the mouth and the resultant intestinal infection manifests itself perhaps many years later as consumption.

Professor Von Behring says that Naegeli found that all the bodies of persons over 30 years of age showed *post-mortem* signs of tuberculosis. Between 18 and 30 the percentage of infection was 96; between 14 and 18, 50 per cent.; between 5 and 14, 33 per cent.; between 1 and 5, 17 per cent. In children under 1 year clear evidence of its existence was not found. Franz got a tubercular reaction from injecting tuberculin in 61 to 68 per cent. of

Austrian soldiers. Berend got no case of positive reaction in 96 very young children, many of them sickly and with tubercular parents (*ibid.*).

Not only have our ideas of the operation of inheritance in this disease altered, but our ideas of its curability also. There is abundant evidence to be obtained from living persons to show that after a usually protracted period they become free from bacilli and from the results of their presence. There is still more definite evidence from the results of *post-mortem* examinations that an altogether unsuspected number of people have tuberculosis, recover from it completely and die of some other disease, leaving in their bodies the indelible impress of the previous bacillary infection.

But, nevertheless, if we know that a man has ever had tuberculosis it is not worth the while of a Company to take his risk except at such a rate as is practically prohibitive. With the results of antiseptic sanatorium treatment before us, we are too apt to hastily rush to the decision that a case is *cured* when the disease may be arrested and not utterly destroyed; so destroyed that the patient is left with no more liability to infection by the bacillus than his fellow-men who are not known to have had the disease. "Cure" of tuberculosis that is lasting is a much rarer outcome of treatment than some admit. I have dealt largely with this disease as it affects throat, nose, ear and lung, and I have only recently treated a young lady for the third time from whose throat and nose I thought I had removed *Lupus* 10 years ago but who proved not to be cured as one hoped, and though again there is no speck of trouble left, yet I cannot guarantee her against recrudescence of disease. Such a person is not one to accept, especially when we remember that although it has been local up to now, there is no certainty that I shall not see a general outbreak in other organs at some later period of life, and perhaps under some specially trying physical circumstances. Two of this patient's sisters have died of pleuro-pneumonia!

Syphilis is inherited but shows its presence at the time of birth, and it therefore exerts its baleful influence in the early years of life usually.

Gout is doubtless inherited, and more and more importance is rightly being given to this disease, because of its possible effect on the kidneys and through them, on the heart and arterial system.

When we turn to affections of the nervous system—insanity, fits, and so on—there is no doubt whatever as to the influence of inheritance. We inherit in this domain probably more strongly and exactly than in any other. Temperament, such as geniality or moroseness, restraint or not of passions are matters of inheritance which can be definitely traced. Insanity and fits are also diseases where inheritance comes in strongly, because the unborn offspring of parents so afflicted, or having ancestors so afflicted, may take the hall mark at the time when the mother conceives and also during the time that elapses prior to the birth of the child.

is another disease that has rightly a good deal of importance placed on it. We know that this is either really inherited or at least is very early in life acquired because many of the cases of so called “growing pains” in children are doubtless rheumatic. We know further that very slight attacks of joint rheumatism are very apt to leave an impression on the heart by shrinkage of valves. Therefore, when I hear a man say, as happened in the case of a fine young man only a short time since, “I have to use oils to rub into my ankles for swelling and pain,” I always take special care to examine the heart, and rejected the case now in my mind because of serious interference with cardiac circulation, probably of rheumatic origin, but giving rise to no definite symptoms.

apparently is inherited, but not nearly to the same extent as are some of the other diseases we have mentioned. Diabetes is much more serious in young people and they cannot be accepted, and a glycosuria always means deferment if we can think it due to temporary causes. In older and, especially, fat people the disease is not so deadly, and they may be taken as second-class lives.

The practice of different Offices with regard to insuring those who have had Syphilis varies a good deal, some always rejecting them, others making them pay increase of premium. I find it very difficult to contest the position of those who absolutely refuse to take these cases. There can be no more utterly unsatisfactory case to load with extra premium than a man who has had syphilis, and so far as the syphilis goes, it is usually impossible for the medical officer to help the Office. The proposer may have had the disease years before the examination. He may be in the most robust health, he may have sown his wild oats to the last grain, and yet many years afterwards he may have an attack of tertiary

syphilis that may rapidly terminate life. I have seen a great deal of this disease, especially in the hospitals of Vienna, and I remember an old soldier who had had no manifestation for 32 years and who had a hole ulcerated through his breast bone and who was in a terrible condition. Of course I am aware that in those who are "better off" more care is taken in the primary and secondary stages, but still the dictum of a distinguished French surgeon that "you may make many treaties with Syphilis but never permanent peace" holds true.

Further, there is that indefinable inheritance, often coupled with faulty environment, which gives us people who have, so to speak, a lower curve of health—where the offspring are all their lives weaker than a good average man or woman should be.

"It may not be out of place here to consider how racial immunity may be accounted for. It is most probably an acquired tolerance due to natural selection and inheritance. In a population attacked by a specific disease the most susceptible perish, and such as are individually immune or least susceptible survive and beget offspring with the natural resistance by inheritance. By a repetition of the process a racial immunity could be established. This, however, does not lead us any nearer a solution of the question as to how this primary individual natural insusceptibility is produced or originated.

"Apart from the evidence in support of the possibility of inheritance of disease by means of direct transmission from parent to offspring, and which is rather a direct infection from parent to offspring than a true inheritance, one can understand the possibility of a true inheritance of natural resistance or susceptibility. In cases where the tissues of the parent are primarily susceptible, or rendered so by any process, to infections, such susceptibility may be transmitted to the offspring, although not necessarily specific to any one definite infection. When one so often recognises inheritance of such minute physical details as the colour of the irides, minute reproductions of outlines, the shape, character, and early decay of the teeth, the colour, and, in many cases, the loss of hair taking place at a definite period of life, the quality of intellect, and minute peculiarities of disposition, one cannot easily put aside the possible occurrence of inherited resistance or susceptibility." *Dr. Buchanan, Brit. Med. Assoc. Meeting, 1903.*

This is the kind of inheritance which makes it very difficult for the medical adviser to hold the balance justly between candidate

and Office. These people have usually been well cared for during the growing period of life, and they have taken care of themselves since they left the parental roof. Recognising that they are not so strong as others, they do not expose themselves to many of the risks that other men do. These people have weak organisations, but they do a good deal of work and they don't often call in a doctor, but were they to run the physical risks that strong men do they would speedily find that the adverse influences in life were too powerful for their feeble resistance. What is to be done in such cases? They can hardly be classed as "first-class lives," because even within the limits of what we may still call "first class" they hardly have a place—and yet they have no disease, and with the care they take of their health they often succeed in living well up to their expectation of life. If these people's policies are loaded with extra premium then I think some plan should be devised by which the loading should be a debt on the policy, to be gradually wiped off when the insurer reaches the expectation-of-life-year of the increased loaded age of starting, *e.g.*, if a man is 30 years of age your average duration of life tables say he has $34\frac{1}{2}$ years; if you make him start his premiums as if he were 40 years old, he has $27\frac{1}{2}$ years of expectation. I have taken, at random, the premiums to insure £100 with profits from a society of standing, and I find that it is £2 1s. 6d. at 30 and £2 14s. 9d. at 40 years of age. Now in $34\frac{1}{2}$ years the insurer of 30 who is not loaded has paid £71 11s. 9d., and the insurer of 30 who is considered to be 40 has paid the same sum in just under $26\frac{1}{2}$ years. About the time when this latter period had been reached some re-arrangement of premium or of sum assured at death ought fairly to be made, or bonuses should be made larger than in the unloaded case. Or you can start the loaded policy at the unloaded premium, but with a debt on it to be gradually wiped off according to actuarial determination. I believe there are methods already in vogue, but I know that many insurers object to loading unless they have the prospect of reconsideration of the matter in their favour, when they have succeeded in showing the Office that they are better men than it was thought they were at the time of entry.

Another way out of the difficulty is to insist on these people taking a fairly short endowment policy; but possibly the best way of all is to keep them in a class to themselves, then they enjoy all the bonuses that can come from their proving themselves to be better men than was originally thought.

I know that I shall be met with the obvious objection that the companies lose by those who, although loaded, do not live as long as was expected, and so it is necessary to make the others who really are "first class" live as the event proves, although this was not believed at the time of insuring, live longer than it was thought they would do.

But I should like to know if those Offices who lay themselves out for so-called "Invalid" lives and who have thus reliable statistics can say what is the average result in these people. Do they, in other words, as much exceed the Office expectation of life for them as is the case for sound and unloaded lives? I am inclined to believe that this is so, and even to a greater extent.

The recently published reports of the New York Mortality Investigation Committee show that the mortality is found to be less than the normal in cases in which one or more parents have died of phthisis. These results are obtained from cases which have been accepted for insurance after very careful examination. Yet such insurers, though they show no "delicacy of aspect" or "weak physique," are well "up to normal weight" and so on, are often burdened with extra premium because of their phthisical ancestry. They grumble at this, and I think rightly, unless some re-valuation is undertaken later, or they form a separate class. If this is assured, then, from what I have previously stated, I think loading is fair.

Some plan of this sort should be formulated, and it is all the more necessary when we remember that bacterial infection of any kind will often attack the strongest and leave the weak people untouched, although they were all equally exposed to infection. This is true of such diseases as tuberculosis and typhus.

As has been truly said, "a microbe must make its living," and in some soils it finds it, in others not. Some microbes thrive in a slightly alkaline and some in a slightly acid soil. So that, apart altogether from heredity, giving an individual "vital force" by inheritance, other factors must evidently be taken into account. So that loading, from the fact of family history being bad or the individual's vital force not being of the highest, and only for these two reasons, demands some especial plan to deal with it fairly.

Returning once more to the question of race susceptibility, *The Medical Press and Circular*, November 11, 1903, says:—"An able essay on this subject was read at the recent meeting of the British Medical Association, by Dr. R. J. M. Buchanan. The

great value of his communication lies in the bird's-eye view it gives of race susceptibility throughout the nations of the world. To tuberculosis, for instance, the Gaelic and Cymric race are considered more susceptible than the Saxon or Scandinavian. Negroes, on the other hand, are very susceptible to tuberculosis, especially in countries not native to them. Cancer is said to be rife in China, while it is rare in Egypt, uncommon among negroes, but prevalent among the blond inhabitants of Norway. It is a well-known fact that smallpox is exceedingly fatal to people among whom it is introduced for the first time, as shown among the North American Indians, where the Mandon nation was entirely destroyed by it; and in Iceland where, in the earliest epidemic, eighteen thousand out of fifty-two thousand perished. Negroes are very susceptible to sleeping-sickness; other races are not so. Jews are believed to be prone to diabetes and nervous diseases; Chinese are exempt from chorea; the negro is almost exempt from yellow fever, in which the order of susceptibility runs:—Scandinavian, Englishman, Southern European, Creole, Mulatto, Negro."

This question of racial immunity or susceptibility is one that is most important to remember for Insurance Companies, especially those whose policies go into the uttermost parts of the earth.

Quoting again from *The Medical Press and Circular*, November 11, 1903:—

In the enthusiasm born of a hopeful industry, "The Psychology of the Consumptive. In the application of what we may call the gross hygienic treatment of consumption, there is a danger of managing cases as animals to be hardened and fattened and made sleek and rosy rather than directing them as sorrowful and oftentimes harassed human beings needing much more than open air can supply or a vigorously conducted regime sustain. In short, we are of opinion that the psychological aspects of the situation are in danger of being overlooked, and in some institutions almost neglected. In the first number of the *Parisian Archives de Neurologie* for this year there appeared an interesting symposium on this subject, and in recent numbers of the *New York Medical Journal* Dr. G. A. De Santos Saxe has dealt with the psychical relations of tuberculosis. His conclusions are of much interest and of considerable suggestive value. The consumptive usually exhibits traits of mind and of temperament that have been made use of to a large extent

in fiction, although they have not received much serious study from medical men. The mental and moral degeneration only too apparent in many consumptives, leading in some instances even to criminal tendencies, is thought by many to be dependent on a toxic condition of the central nervous system, states which certainly often play an important part in the etiology of neurasthenia, psychasthenia, hysteria, and insanity. We are inclined to think that in many sanatoria the habit of life initiated and maintained by the very course of treatment is detrimental to altruistic tendencies and rich in inducements to selfishness and sins of idleness. Certainly many consumptives manifest loss of control, animal self-centring, increase of susceptibility to suggestion, emotional displays, attacks of nervous irritation, and readily show evidences of nervous and psychical fatigue. Sexual irritability, at least in some cases, seems to be raised in the early stages of the disease. There is certainly a distinct connection between tuberculosis and insanity, but as to the causal relationship we are by no means clear. The medico-legal aspects of tuberculous intoxication merit serious study."

The question of temperament is one that we must take into account in endeavouring to judge whether a person is likely to live up to the allotted time of the tables. The worrying and fretful on the one hand, and the very intense person who is much given to public work, who neglects all the pleasures of the table for a committee meeting, who habitually never "lets himself go," but leads a life of rigid restraint and works hard in season and out of season, piling on public work and hardly knowing whether he has eaten fish, flesh, fowl, or good red herring at the end of a meal, are both people who ought to start well endowed by inheritance and upbringing in early days to stand the undue strain that they put on themselves. Work does not kill like worry, but we know that we have to do with people who are burning the candle at both ends, doing good often to their fellow men and women when they have finished their day's strenuous work for their wives and families, and we know that such people are not of the best as lives. They always sail so close to the wind of a physical breakdown that the stress of severe illness finds them utterly ill provided to meet the extra demands on their physiological banking account.

The old difficulty of deciding what is innocuous moderation in alcohol is always with us. We know that, scientifically, we can

say that a man of a certain weight doing a certain amount of work can wholly destroy in his body a certain quantity of alcohol. But this cannot be worked out in everyday life, and we are perforce compelled to judge more by our native wit than any other quality or knowledge that we possess in deciding whether the statements on these points that the candidate for insurance gives to us are true. Moderation for one man is excess for another, and the dangerous man for Life Companies is the one who rarely or never gets drunk and yet habitually takes several whiskies a day, and so keeps his tissues, and especially stomach, liver, and kidneys always subjected to the influence of a powerful agent for evil. A medical friend of mine lately examined, for a certain office, a number of proposers who were introduced by an agent for the Company who was well known to be a careless liver. The agent, who was an exceptionally strongly built man, was rejected because he had alcoholic irritative albuminuria, and also a very unusually large number of his friends who were introduced by him, and for the same reason. There was no confession of immoderation, and possibly few, if any, drunkards amongst them, but they were uninsurable, and this not so much because of the slight albuminuria, because this would probably in most, if not all, cases have cleared away when the alcohol was discontinued, but because of bad habits this was likely to be persistent. A man who is really careless about the amount of alcohol that he consumes is a dangerous man to accept, for that and other allied reasons.

THE PRINCIPLES OF ORGANISATION IN AN INSURANCE OFFICE.

By T. E. YOUNG, B.A., F.I.A., F.R.A.S.

*A Paper read before the Insurance Institute of Manchester,
February 8, 1904.*

WHEN your kind and fully appreciated remembrance of me assumed the form of an invitation to address you, I felt a slight reluctance at the outset exclusively upon the ground that my departure from active participation in the toils and rivalries of our common pursuit seemed to cast an illusory light upon the project, for I reflected that to you, who are still engaged in the stress of professional energy, an address from one who had passed beyond its strenuous activities would present a somewhat antiquated and irrelevant aspect. However, I further judged that, in addition to the pleasure of personally renewing my acquaintance with you, there existed the obligation that one who, from prolonged experience and observation, had attempted to collect and estimate the principles which animate and guide our common work, was by virtue of those lengthened labours bound in courtesy and goodwill to render any service, however slight, which might be usefully deduced from his survey and meditations in the past. I was again confronted by the perplexity that I have just prepared a book upon the subjects of Organisation and Management as a sequel to my recent volume upon "Insurance," and a mere *réchauffé* of the contents of a treatise about to be published would be paying but an unseemly compliment to the confidence which your invitation expressed. But I am encouraged by the remark of a wise author that upon all great subjects, whatever be the amount of thought and counsel already expended, much still remains to be said, and hence I trust that I may be able to

expound the salient features of the problem of Organisation in some fresh and distinctive setting which shall happily avoid this passing possibility of identity of presentation,—the characteristic elements, as in all expositions of wide questions, must remain, but the mode of exhibiting and enforcing them need not necessarily coincide. I restrict my address to the discussion of the principles of our work: that is to say, in agreement with the genuine meaning of that term, to the beginnings or foundations on which all sound effort must be based; the moral, intellectual, and practical guidance to which all activity must conform if the contemplated end is to be achieved; although I shall occasionally introduce any explanatory or hortative comments which my experience may have impressed upon my mind. I have begun by adverting to the etymology of one of the terms intended to be employed; and my first observation, suggested by this reference, is the necessity of precisely defining our nomenclature in theory and work, and in a note appended to this paper I have ventured to submit a few illustrations of the value and pertinence of this remark.

The greater proportion of failures in reasoning, and in the deductions from that reasoning for practical purposes, has not been attributable to defects in alertness of intellect, or in keenness of perception, or to paucity of knowledge, but simply to the absence of exactness in the definition of words in the process of reasoning. It is evident that when a term of wide import is employed in discussion or deliberation, diverse conclusions will ensue, since one person will have prominent in his mind one portion of the meaning of that term, while to the other disputant a different section of its connotation may be more impressively and obtrusively presented. And the validity of all reasoning depends upon the determinate and accepted significance attached to the term which mediates between the premises and the conclusion.

Organisation is derived from a Greek word which, originally signifying an instrument or tool for constructing any article, passed through an extended range of meaning to the material of which any work was composed, and finally embraced the notion of the work or product itself,—the term being itself ultimately derived from another (and obsolete) Greek word indicating a work or deed or action. The term has now acquired the significance of the means or instrumentality by which a thing is accomplished. Now to effect any object, to perform any act,

implies two elements, of which the one is the End to be achieved, while the other is the method of Organisation by which it is to be secured. If the End be not luminously distinct, the most skilful organisation, it is obvious, will fail, while if the method of procedure be confused or inadequate or imperfectly employed, the desired end, however clearly conceived, will simply remain as a defeated hope. The end of our labours consists of security to those who commit their interests to the custody of the Company, and the realisation of the highest profit (consistent with this condition) to the shareholders who incur the risk of capital and (in Life Assurance) to the policy-holders, who depend upon our sagacity and soundness of trading.

All schemes in life, whatsoever be the objects they are devised to attain, involve moral no less than intellectual elements; and hence a discussion upon organisation cannot be detached from the former order of considerations, though obviously care should be taken, in a scientific exposition, to view these factors in relation solely to the method adopted and their influence upon its execution and results. And, again, no effective organised arrangements can be prosecuted without leaving for evil or good a definite and persistent impress upon the character of both the designer and supervisor of the scheme and of those to whom its practical accomplishment is entrusted.

In every department of organisation we discover the principles and modes of execution from the disclosures of Nature, organic and inorganic, and from the natural processes which Physical Science elicits and presents. This source constitutes the fountain of our most practical and soundest knowledge: and it is true in this sphere of work as elsewhere, in the wise admonition of Lord Bacon, that man, as the humble but sedulous interpreter of Nature and her secrets, advances by this method of inquiry into mastery of her processes and the application of those processes to all his practical needs and activities. It would prolong this address to an inordinate length if I adduced individual examples of this thesis, and I must therefore confine myself to the statement of principles alone which are discernible in this survey. For like Nature, whether in her minutest forms or in her most imposing masses, our social and commercial life is an organism, that is to say, a state or structure formed in such a fashion that every part responds in action to every other part; that though the several functions be different, they all harmoniously

conspire to an evident, unitary end; and that the integrity of movement and capacity of the whole and of its component sections essentially depends upon the completeness, in unison of action and aim, of each portion, however insignificant it may appear. For insignificance is not absolute but relative, and we know that in all mechanical contrivances and adaptations, for example, a failure of structure or of assigned duty exhibited by any fragment of the machine will entail frustration of the entire mechanism, however skilfully and elaborately the pieces may have been devised and conjoined.

Turning, then, to the revelations of inorganic and organic Nature, we perceive in every form of work and in every sphere of the universe a combination of principles of structure and function, equally in the quiescent stone upon the road as in the constitution and revolutions of the worlds, which uniformly present the characteristics of Simplicity and Directness for the attainment of the implicit end: a Dependence of every portion upon the remaining constituent portions, of the whole upon its units, and of the units upon the mass: a Harmony and Adjustment of parts and activities congruous with the purposes which the mass or molecule is intended to effect: a gift of Elasticity and Internal Growth competent of successive adjustment to the increasingly complex conditions of existence, so that the finished form, when the aim of its design has been accomplished, is seen to be implicitly inherent in the primitive germ, of which it is the unfolded and spontaneous development. Hence the rules expressed for guidance in our practical efforts by the entire scheme of Nature comprise Simplicity, Gradual Growth, and closer Conformity with external conditions and circumstances which the organism, as it progressively evolves towards its completed state, must successively meet and fulfil. An absence of congruity of adjustment to what is usually termed the Environment, or the enlarging conditions of existence, implies impotency, decay, and death, while an energy and exactness of adaptation to these larger and more testing surroundings are prophetic of unabated progress and of precise attainment of the destined end. I ought also prominently to mention a universal mode of order observable in Nature; the fact, namely, that all development takes place along the Line of Least Resistance, so that the minimum expenditure of effort is involved and the minimum amount of friction encountered. And

the closer imitation of the processes of Nature accordingly constitutes the criterion of successful or defeated energy.

Under the illuminating guidance of this scientific investigation, I proceed to enumerate the leading defects which often mar the accomplishment of our purposes through deficient organisation, and, correlatively, the principles of design and execution which an ample and sufficing method should erect as the Ideal of its constructive efficiency.

Systems of organisation frequently fail on account of Cumbrousness: the originator is so unwisely careful and anxious to avoid possibilities of defect that the multiplicity of details introduced, the minutiae of rules, and the excepting qualifications, form final barriers to perfect attainment. The plan should be simple, direct, and unencumbered in its outlines: a broad, general sketch in place of an exactly finished picture, so that experience of new conditions may gradually and imperceptibly complete the outline into natural and unforced fulness of comprehensiveness.

The parts of the official machine, too, may be ill-fitting or incongruous: a disproportioned prominence may be assigned in one direction, an inadequate exactitude in another, so that, violating the singleness and symmetry of all Natural methods, the want of co-ordination will result in derangement, friction, and arrest.

It is true that the demands which any system must successively satisfy will be augmented with exposure to trial: the texture of surrounding conditions will pass into greater complexity and will accordingly enforce larger claims upon the facilities of the machine; but here again Nature presents the guiding lesson that this expansion of power in a scheme must be a spontaneous growth—that is to say, the simplicity of construction must involve the inherent capacity of development from within, not imposed from without, which future necessities will require. An organism in Nature, exquisitely simple in its mode of formation, always, when its ultimate perfection is attained, comprised within its being the capability of facile and ready expansion of powers and adjustments as the condition of its prosperous and completed life. And this inference conducts us to the most fundamental conception derived from the observation of Nature. The consummate beauty and marvellous symmetry which the flower finally reaches is implicit in the primitive germ, and evolves by easy and natural process as the external conditions of

its life exact their deeper calls upon its inherent gifts of growth and unfolding. So in our systems of work. Space must be left everywhere in their structure for unforced development: elasticity of framework and design must be provided for expanded services: and the ultimate capacity of full and free accomplishment must have its hidden foundations securely laid in the original form. All Nature is congruent or persistently harmonious in its parts, in the interrelations of those parts, and the relation to their integrated wholes. And every plan of organisation contains the inherent marks of inexactitude and decrepitude if this corresponding principle of life and unity be not involved. I venture, parenthetically, to submit an illustration, which will subserve a double purpose, from Life Assurance—the method of distribution of profits. Framed at probably an earlier and more immature date, when actuarial science was less advanced, some of these schemes have exhibited so rigid a form, and a fixity confirmed by almost immemorial use,—without the intervention of attempts to remove them, at the time when alterations could have been smoothly introduced, to suit changed and changing conditions of business,—that reform, when its urgency could no longer be ignored, has been compelled to assume the nature of revolution, and the principle itself of the system has demanded virtual abandonment. For the longer an ill-adjusted plan has continued in operation, the more radical becomes the change, in place of a graduated adaptation of its primitive principle to the fresh necessities and aspects which have occurred. And, again, the scheme may prove by retention so incongruous with modern and more enlightened conceptions, that modification is impracticable, and no course other than a total revision or displacement, can conform adequately to imperative needs. Systems, for example, have based the appropriation of profits with complete independence of the relation which should exist between the amount of benefit and the extent of contribution, and a decisive departure, with possibly severe disruption between past and future ratios of participation, has testified to the unwisdom of origination and an unwise persistence in a misdirected course which have marked the administration in this aspect.

In all systems of organisation we must remember that the precision of automatic execution displayed in Nature fails, for we deal with men as the agencies; men with imperfect capacities like ourselves; with higher or lower degrees of moral rectitude and

tenacity as exhibited in zealous or neglectful work; and, however earnest and intelligent, beset at all times by the infirmities and lapses incident to the limitations of our faculties and better desires. The wise Administrator, therefore, must include the element of a possibly (or rather a probably) partial impediment in the facile working of his machine, and, having made this necessary forecast, must, when the stress occurs, simply display the mental and moral stuff of which he is composed by the substitution, for disappointment and dismay, of a ready and resourceful capacity in the repairment of errors and the renewed readjustment and recasting of his plan.

I turn now to the workers as an integral portion of the organisation, to whom is entrusted the execution of the scheme. Apt selection of men is the signal mark of a genuine Administrator, and this obviously involves a clear and steady insight into character and capacity. Where a candidate has not already proved his fitness or incapacity by prior trial, the test of efficient choice is difficult, and particularly where the applicant is at an age when the pliant and immature character has not yet had time or opportunity to disclose even the promise of its possible powers or defects. A skilled and observant eye, however, can generally detect the indications significant of the future, and where doubt or hesitation exists a safeguard lies in the prescription of a period of probation during which the probable line of direction in the future is likely to be discovered in some sufficient prominence for decision.

Having fitted the worker to the organisation, his duties and the dates of their periodical completion should be clearly defined, and a series of important anxieties and responsibilities then devolves upon the Branch Manager. For the Manager is not the moving spirit merely of a mechanical process; his agents of execution are totally diverse from the agencies of Nature; they consist of men with possibilities of good and evil, as I have said; with moral characters no less than intellectual capacities to be wisely and righteously guided and developed: an industrial family, in short, of which the Manager is the accredited and responsible Trustee. I hold decidedly the doctrine myself that during office hours at least, and, so far as propriety and influence will admit, throughout the boy's early lifetime, the Manager should deem himself to be his guardian and guide in the formation both of well-directed and expanding ability and also of the cultivation of moral habits of life. The Manager cannot, of course, enter into the details of

ordinary life, nor act as a kind of general moral tutor, but various legitimate modes of supervision and influence are feasible which will simultaneously tend as an educational governance and direction of the youths; the completely practical efficiency of the organisation adopted; and the consequent advantage of the Company in which all possess a common interest and for which all should exhibit a common pride and trust. The first incentive to these results points to the maxim that no rebukes should be offered during the stress of anger, however deep be the provocation. Such reproofs delivered in a period of passion not merely diminish the respect in which the utterer should justly be regarded as the governing spirit to be imitated, but they usually are attended by a want of judgment and incisiveness, and, consequently, by an absence of justice; while they further abrogate their authority and force as a corrective and disciplinal remedy for error or neglect.

A rebuke administered when the transient fit of anger has passed involves an inherent insight and decisiveness; cultivates the sense of just and discriminative treatment in the minds of the persons reproved; and possesses the significant moral value that the rebuke embodies the reprover's personal concern and hope of reformation in the offender—a trust which always contains the possibility of concordant and genuine response. The etymology of the word "passion" should always remind us that the subject of this emotion has, for the time being, relinquished mastery of will for servile obedience. A second aid in this direction is imperative both in respect of the adequate performance of work and of the promotion of the characters dependent, to an incalculable extent, upon our supervision and care,—the necessity, I mean, for creating and conserving a pure moral atmosphere in the office by the appointment or promotion only of youths and men who, possessed of the requisite mental and technical qualifications, are also ascertained to be persons of high principles of life. No event can possibly be more disastrous or can more impressively discredit the capacity of an Administrator than the allotment of superior positions to men who are likely to exert an immoral influence upon the subordinates whom they command. I need scarcely advert to the final condition that the Manager himself should prove a standard of imitation in excellence to his staff; serene in judgment; broadminded in nature; commiserate, as conscious of his own limitations, to errors originating from our

common defects, and attributable neither to indolence nor neglect ; strong and unfailing in a sense of justice ; abounding in courtesy and just self-respect based upon a high ideal of his trust ; decisive in will and act after full meditation ; courageously hopeful in defeat ; and dedicating all his powers and aptitudes to the finest performance of the duties committed to his charge.

Viewing generally the difficult question of the treatment of Faults and Errors—particularly those which, with the exhibition of zeal and attention, are contingent on our deficient mental and moral constitutions,—I would merely add that, since severity of action may entail grave consequences on the delinquent's path in life and prospects of reform, anxious care should be devoted to the consideration of each individual case in connection both with the offender's character and future, the interests of official order, and the adequate maintenance of efficiency of work. Too frequently we ourselves err by adopting the easy but erroneous practice of applying a fixity and rigid uniformity of rule and decision to every form and degree of error ; but, though the course is laborious, the test of real justice and discriminative capacity lies in the nice adjudication of penalty to fault : the appreciation, defined by a clear sense of equity, of the individual incidents of the instance : the distinction of the gravity of cause and effect which varies endlessly in human transgressions. An appeal to honour and high principle will often preserve the integrity of a nascent career, marred temporarily at the outset by some breach of order or practice.

People frequently deride in thoughtless ignorance the importation of "sentiment," as they term it, into examinations of this nature, and appeal to the serviceability of invariability of rule. They foolishly term us sentimental when we interpose the benign power of sympathetic concern into the rigid uniformities of command. But they forget that sentiment (or feeling, as the word signifies) is the primal motive power of all life and enterprise : the attainment of a specified object originates not from the excitement of the intellect but from a feeling or desire : the place and function of the intellect are not the fount and source of effort but simply the organ for devising the adequate means or mechanism by which the end, proposed by the feelings, may be successfully reached. A relevant subject may be summarily suggested,—Suspicion and Trust. Not alone is competency of work impracticable but, further the clear-sightedness and comprehen-

siveness of intellect are neutralised if the mind be distorted by the evil intrusion and dominance of suspicion. This debasing element both obscures and obstructs : it enlarges minutiae into magnitudes, and always in a malign form : it makes things appear to exist which possess no being : it degrades the character of the person whom it rules, and equally it deteriorates the characters of those to whom it is applied by engendering evasion, and deception, and restraining the spontaneous expression of thought and feeling. If you select men with scrupulous care, and find your confidence returned, trust them with fulness and constancy of faith. For one error which mistaken trust will produce, ten errors will be avoided by the absence of suspicion.

Some concluding and fragmentary observations may be permitted upon the duties, range of action, and the modes of recognition and performance of responsibility which apply to the Branch Manager himself, as the prime mover of the local organisation. I have always entertained a deep and sincere sympathy with Branch Managers as valued and able contributors to the success of the Companies they represent. Their labours are complex and difficult ; their duties multifarious and onerous ; and the adequate discharge of their responsible functions implies a conjunction of qualities, personal, professional, and commercial, which, in the genuine type of those officers, have often excited my respect and admiration. In offering to them a few remarks upon this aspect of the subject of organisation, I do so with a complete and cordial recognition of their merits and work. My first observation is that the testing criterion of a Manager's endowments for administration, whether his position be a principal or subordinate one, consists of his capacity for Economy. And in this expression I include—as essential to all effective plans of organisation—Economy in the use of time and labour, so that the greatest result may be practicable with the least expenditure of energy and time. This lesson is universally taught by all the processes of Nature, where parsimony—a wise parsimony—of effort is attained by adroit and ready selection in the performance of work of the Line of Least Resistance, with the consequent economy of needless toil which can then be liberated for devotion to efficiency in other modes and for probably higher service. Especially do I include economy of cost in securing results, since this achievement is not simply a valid index of full capability of management, but a primary source of financial strength, power of

resource, and productiveness of pecuniary issues. My further survey of efficiency of work in the Branches suggests that the time and vigour of the Head Office should be economised as largely as possible by the thought, resourcefulness, aptitude, and responsibility of the Branch Manager. Many occasions must necessarily occur when the decision of the final tribunal, the Head Office, must be obtained, but a multitude of opportunities also exist where a sagacious and observant local manager can form his own judgment, and thereby materially assist in the general administration by avoiding, where it can properly be arranged, the necessity of attention and the diversion of time, already severely and incessantly taxed in an extensive business, of the chief controlling power. Even an error of judgment in the exercise of this function may prove a venial and improving fault: a lesson will be derived from it for more keen-sighted and thoughtful observation and judgment in future ventures. Without for a moment countenancing error—for my own teaching has studiously comprised Accuracy with Exhaustiveness—I would add that frequently we tend to be too gravely afraid of mistakes. The timid and unsuggestive man will, no doubt, enfranchise himself, by this dread of responsibility, from many reproofs and adverse pressure of events, but he will concurrently forfeit the crowning reward of a solidity and completeness of character and force, born of the discipline and remembered guidance of mishaps. To the earnest and conscientious man, an admonition is directive and illuminating,—though to the careless it is devoid of all this helpful and educative significance,—in pointing out that permanent victory and consummate power of nature are organised out of errors, when sedulously pondered and wisely utilised as beacons for more vigilant and steadfast pursuit. Upon another aspect of our subject it is adequate to observe that since, in some form or other, we are all under honourable servitude, that man of us possesses the more dominant gift of command over others who has himself learnt loyally to obey. It is an ancient but not antiquated aphorism that the art of true obedience is the sure guide to the art of genuine control.

The considerations I am now adducing may appear at first sight to be merely personal and ethical, but reflection will reveal their pertinency and impressiveness in relation to all organisation, since no system of administration can be stable and adequate unless the character no less than the ability of the Manager form

the subject of sedulous thought and cultivation as the main agents of efficiency.

Among the primary defects in competent oversight and grasp in organisation is minute attention to details. But this broad proposition will be valueless and misleading without some explicit exposition and limitation. An analogy derived from mechanics, where the entire machine succumbs to stress if the smallest link prove defective in strength or fitness, would be evidently exaggerated if applied, without restriction, to the structure of human organisations. But yet it is an established truth that no system of work can fully accomplish its designed purposes unless not simply the general framework but also the detailed parts and relations of which it is composed be mastered both in conception and execution. On the other hand, the devotion of a Manager to the minute working of his machine involves a twofold detriment; the vigour abstracted for this service is necessarily obtained by utilising a diminished amount of energy in more productive and permanent forms of activity: efficient oversight, alertness of mind, power of resource, and ready adjustment of his organisation to intenser demands and novel conditions, must to an appreciable extent be forfeited if the mind, which should be absorbed in these larger and more impressive modes, be frittered into uselessness and deficient keenness of capacity by constant or excessive devotion to the minutiae of routine work. And a deeper disadvantage lies in the fact that force and freshness of mind and energy, needful for supervision and control, are not simply squandered, but even become absolutely deteriorated, by sedulous attention to details and routine. Our nature is similar in its phenomena, though not in constitution, to a given, constant, plastic mass of material,—expressing the facts without precision,—where protrusion or development in one direction can alone be accomplished by depression and deficiency in another; if by moulding the substance in scope or fashion the one portion bends outwards and shows enlargement, some other part must simultaneously be indented and exhibit decrease. The application of this principle, which pervades all Nature, physical and mental, is evident. Eminence in any form of intellectual or commercial activity is only competent of realisation by diminished power of capacity in some different mode. A definite restriction of choice is thus imposed. The practical lesson consequently is enforced that while a mastery of details, a just conception of their intimate value, and

the efficient ordering of their disposition, must constitute a conspicuous attribute of every competent Manager, he should entrust, in practice, their execution to skilful and conscientious subordinates, and exercising over them a *general* and vigilant supervision, liberate his serviceable faculties for devotion to the wider and more imperative demands of higher responsible labour. Upon the vital subject of Decisions in business a few words will suffice. Their validity involves adequate knowledge of the appropriate facts; sagacity in foreseeing the results of diverse courses of judgment and sequent action; an intimate acquaintance with the characters of men whom the decisions will affect, and their motives; and a firm and persistent will with suavity of form in its expression and a just appreciation of equitable, conciliatory compromise. Decisions which require rapidity of formation are most likely to be accurate in proportion to the wealth of past examples, either gained in direct experience or perceived in the experience of others, with which the memory is stored. But stored, I mean, not as an accumulated mass of uncoordinated knowledge, but analysed by thoughtful scrutiny of the causal connections between them and the motives and judgments on which they were founded: the facts, for example, that a certain judgment was followed by a certain result, and that a different issue succeeded a different form of judgment. With an equipment of this description, the mind will be prepared, when a problem is presented for adjudication, to select from its storehouse of remembered concrete examples the particular case which is fundamentally similar to the one for which a solution is required, and, with due recognition of any variation in the attendant circumstances, to accept the guidance thus indicated. Where decisions can be studied and pondered before they are transmuted into acts, a very serviceable plan is to compile on paper day by day,—and subject their comparative consideration and valuation to varying moods of thought and feeling,—the reasons which suggest one special course of action and those which tend in favour of another. By careful analysis and estimate, and the successive cancelment of opposing reasons which appear to balance each other, the predominant reason on one side or the other remains at last alone, and points to the road which it would be wise and prosperous to pursue.

The efficient organiser is the man who recognises the Realities of work and life to which his system of management is related. A chief devotion to office work, and routine arrangements; a habit

of mainly endeavouring to effect and regulate business by correspondence; the conception that the Manager should, like a student, be largely confined at his desk,—though needful in their proper ways and purposes,—do not constitute that abiding sense of Reality which I intend and which enters so dominantly and pervasively into the conditions of success. The Manager must personally and incessantly deal with men and affairs in the external world: study their characters, modes of work, and ruling motives: learn the practical control of men by constant personal contact: and gain a persuasive and flexible power of influence in business, by this persistent and thoughtful experience and observation. And in his intercourse with the Agents and the public, he will discover that although intellect may be rated highly, and skill and aptitude in affairs be rightly accorded a sound esteem, confidence,—the foundation of successful commercial work—is alone won by the exhibition of personal interest, genuine urbanity, capacity of taking trouble, sincere goodwill: the lesson, in short, though the dictum is often ignorantly controverted, that the force of feeling is frequently more operative in achievement of our purposes than the widest mental power or the fullest possession of adroitness and range of professional capacity. And here significantly enters the quality of gracious Concession and Compromise, where righteousness of motive and loyalty to office do not intervene. In the struggle in life we require humbly to learn that the best of us are not all-sufficing: that the exalted view of ourselves which we sometimes cherish to our detriment resides only in the use of a distorted mirror: that men as able as ourselves exist: that our claims and convictions are confronted by the equally valid claims and opinions of others: and hence that the business of life must largely consist of a series of equitable compromises, while the value of these acts of concession for the ultimate realisation of our purposes lies not simply in their prompt and timely recognition, but chiefly in the genuine and conciliatory mode by which this recognition is accompanied. Tact, and courtesy, and righteous compromise, established upon ingenuous goodwill and honourable motive, form the triple forces which impel our organisations and schemes of management smoothly and effectively to their longed-for goal.

May I finally submit a few remarks,—since they involve a bearing upon the efficiency of our plans as affected by personal qualifications—upon the value and imperativeness of general

self-culture,—that is to say, the development of the entire nature in science, art, or literature, or social ameliorating activities, according to predilection or native capacity? I might proceed in this direction under the guidance of two considerations. If we regard this cultivation solely from the practical point of view, or its influence upon the invigoration of our faculties for business life, we shall find ample justification for the pursuit. It is well known that a faculty or set of faculties is recruited and renovated after exercise into renewed and finer power, not by absolute disuse of intellectual energy, but by the intermediate employment of other and distinct aptitudes of mind. Hence in the intervals of leisure the capacities appropriate to business find their recreation and refreshing by the rest induced through the intervening cultivation of other powers of mind. But an ampler and truer view suggests this general development of the whole of our intellectual and moral nature. A man conspicuously fails to realise the fulness of character which may constitute his final dower, if he is content to remain within the narrow and monotonous confines of any particular groove of life or work: the high duty rests upon him to emerge from the restricted form which perpetual devotion to any specialised description of thought and toil may entail, and reach a fuller and more sustained life and range of character by that uniform cultivation of his composite nature which elevates him from a semblance to machinery into the reality and freedom of a dignified manhood.

APPENDIX.

Precision in the use of terms forming the condition of clearness of thought, exactness of expression, and accuracy of reasoning, it seemed to me that it would prove useful if I pointed out some current modes of speech which involve the ignorant or careless employment of words possessing a definite and recognised significance. The examples which I cite are extracted from the speeches of leading statesmen, the works of distinguished scientists and men of letters, and generally the writings of persons who may be justly described by the loose term "cultivated."

The term "Logic" applies to the process of Logic, and its analysing and describing the states of mind which Derivatives. are concerned in valid reasoning, or the correct deduction of conclusions from premises. In respect of the analysis, Logic is a Science or organised form of knowledge: so far as it enunciates the results of that analysis in the shape of rules, it may be described as an Art or a series of directions for the detection and avoidance of fallacies in reasoning.

"Logical" accordingly imports the conduct of argument or a series of deductions in an accurate manner, while "illogical" denotes incorrectness or inconsecutiveness of method. And the process of reasoning or logic is a purely mental one. Now we constantly meet with such ignorant expressions as the following: the "logic of facts"; the "logic of events"; a disagreement between two persons is "logically" closed by an assault; the defence of the Empire must be placed upon a "logical" basis; the "stern logic" of financial events; a certain action is the "logical" consequence of prior acts; in "logic" an agent must proceed in a specified political course (this was the public expression of a most illustrious statesman); into a judicial contest, A entered with "intrepid logic" (this is a statement by a distinguished literary man). All these expressions have nothing whatever to do with logic: the logic of events and facts is an erroneous form of stating the necessary (or customary) sequence of one event upon the happening of a preceding or causal event: the termination of a discussion by assault is not effected by Logic but by the exacerbated tempers of the disputants; the defence of the Empire cannot be placed upon a logical basis, and the phrase is simply an improper mode of affirming that the Empire must be established upon a sound and consistent administrative and executive foundation; the logic of financial events (whether stern or mild) is a misused way of expressing the uniform fact that certain events produce certain consequences; the logical result of a definite mode of procedure only means (by misapplication of terms) that having entered upon a specific course the one step necessarily, or causatively, or customarily, leads to another and derived step;

the strange entry into a business or state of affairs with intrepid logic implies merely, through irrelevance of phrase, that the entry was effected with the resolute determination to carry the transaction through to the end. The terms therefore of "logical" and "illogical" are here ignorantly substituted (under a delusive or careless notion of speaking intellectually or scientifically) for such words as "right" or "true," or "reasonable," or "proper" or "correct" or "imperative," or "in accordance with experience," and their correlatives. The employment of scientific or philosophical terms does not convert the speaker or writer into a scientist or philosopher.

Nowhere is ignorance so manifestly displayed as **Crux**, and in the misuse of this term of Lord Bacon's. It **Crucial**. occurs in the *Novum Organum*, Book II., Aphorism xxxvi. In Aphorism xxi. he mentions the aids to the understanding or interpretation of Nature, and starts with a classification of what he terms "Instances," or cases in which the phenomenon under discussion and explanation is perceived in various forms. In Aphorism xxxvi. he describes Instances of the Cross (or Crux), borrowing, as he states, his metaphor (and the metaphorical and analogical language of Bacon renders his philosophical writings essentially the student's books) from the crosses erected where two roads meet and diverge, for the purpose of indicating whither the different directions lead. The cases in the physical world which we have examined, for example, with the object of eliciting the nature, cause, and uniformities of any phenomenon of which we are in doubt, may suggest diverse explanations or interpretations, each of which appears to be equally valid, and an Instance of the Cross serves as a guide-post or decisive direction to accept the one view or explanation in preference to the other. This directive case is otherwise termed the *Experimentum Crucis*, or the Crucial Instance or Experiment, because it enables us to decide between the two or more rival hypotheses or interpretations of the phenomenon. Let me recapitulate briefly. When in any investigation the mind is placed in *equilibrio* between two or more causes or explanations of any physical fact (and the observation and method apply as precisely to mental phenomena, allowing for the specific intricacy in the latter case), each of which accounts with equal cogency for the difficult problem confronting us, we must endeavour to discover a fact or instance of similar nature to those under inspection which can be explained fully by one of these causes or hypotheses and not by the other, and hence may be properly adopted as the general interpretation. Such a fact performs the office of a crux, or directing sign-post shaped like a cross, or finger-post, which at the point of separation of two roads shows the traveller by the name upon it the route he should pursue in order to reach his goal, that is (taking the cited problem), the appropriate and adequate interpretation. Such a fact (or post) is

a Crucial Instance, or an *Experimentum Crucis*. A scientific illustration will be serviceable. The two Theories of Light, efficiently explained, with equal validity, a large number of the observed phenomena,—the Corpuscular or Emissive Theory of Newton and the Undulatory Theory of Huyghens and Young. It was difficult, accordingly, to decide upon the final adoption of the one in preference to the other as the key to the interpretation of this order of phenomena. But a Crucial Instance summarily disposed of the doubt. If the Undulatory Theory be true, light must travel more slowly in a dense refracting medium than in one of rarer texture, while the Newtonian Theory required that the movement should be more rapid in the denser than in the rarer medium. And subsequent experiment decisively proved that light was propagated more slowly in, for example, glass than in air, and hence this *Experimentum Crucis*, this Crucial Instance, demonstrated the superiority of the Undulatory Theory as the final explanation of the general phenomena of light.

Now we find in the writings and speeches of able and cultivated men a complete ignorance of this genuine meaning of these philosophical terms. We read of the "crux of a speech," the "crux of a proposition or measure," where all that is intended,—and should be expressed in homely and appropriate language,—is the "gist," "pith," "essence," "kernel," or "material part" of the speech, proposition, or measure. All this apparent grandeur of phrase is mere tinsel, and indicative of the absence of historical knowledge of the significance of terms. We hear of a "crucial difficulty," which is an erroneous expression for a severe or stringent or vital difficulty—or a difficulty which tests fundamentally the adequacy of any proposed action or measure. The phrase of a "crucial error" is again improperly employed for a serious or fundamental error—an error that vitiates essentially a scheme or proposal,—the term "crucial" being wrongly substituted, through misconception of its true meaning in Science, for some such terms as "critical," "essential," "substantial," "central," "fundamental," or corresponding words.

We commonly hear of events "transpiring." To Transpire. Events do not transpire: they happen. The proper use of "transpire" (to "breathe across") as to *become known* through unnoticed channels—to exhale, as it were, into publicity like a subtle gas through invisible pores. A secret kept sedulously by two or three persons expands into rumour or "transpires" through avenues which cannot be detected.

The term "predicate" is often used (though the Predicate and occurrence is rarer than the preceding errors) as

Predict, synonymous with "prediction." To "predicate" is to affirm or deny an attribute or quality to an object of thought; to "predict" is to tell beforehand.

Many other terms also scandalously misemployed—such as

“Paradox” and “Eliminate”—might well and serviceably be discussed, for no portion of our modern general education is so shamefully neglected (unless it be the teaching of Physics and Natural History out of books alone instead of by actual inspection of the objects themselves) as the impression upon the mind that the right use of words is the imperative condition, as I have said, of definiteness of thinking, lucidity of exposition, and consecutiveness of reasoning. The vast proportion of the illusiveness and invalidity of argument, as I have already stated, is not due to deficient mental power or imperfect clearness of intellectual insight, but simply to the introduction of confused middle terms,—a *quaternio terminorum*, as it is named in Logic—consequent upon the absence of precision in their definition.

MUNICIPAL TRADING AND FIRE INSURANCE.

By W. HOLBROOK.

*A Paper read before the Insurance Institute of Yorkshire,
March, 1904.*

IN bringing to your notice the subject of Municipal Trading and Fire Insurance it is essential for the right understanding of it that we should trace briefly from an earlier day than our own the gradual growth of the undertakings by local authorities on behalf of their communities. The Municipal Reform Act of William IV., passed in 1835, was intended to remedy defects, the growth of centuries of local administration, and to preserve the advantages of local self-government. The two main principles by which this was to be accomplished were the extension of the franchise over a wider area and the introduction of representation by the periodical election of the Town Councils. The original franchise was limited to householders, after a three years' occupation, whose rates had been paid. Later, the privilege was extended to occupiers of any premises within the borough whether householders or not, having occupied and paid rates for one year, and females were placed on the same footing as males. Subsequently the ballot was introduced into municipal as well as Parliamentary elections. The old freemen, who had usurped the place of the original burgesses, were abolished municipally, though the privilege of the Parliamentary franchise was continued to them. The Act of 1835 provides for the periodical election of councillors by the burgesses, and of the Mayor and Aldermen of the Councils, and also prescribes the division of the larger boroughs into wards electing their own Councillors.

The preamble of the Act sets out with the declaration that corporate bodies have been constituted within the cities and towns, "to the intent that the same might for ever be and remain well and quietly governed, and for this purpose it is expedient that the Charters by which the said bodies corporate are constituted should be altered."

By the sixth section of the original Act, the body corporate of each borough shall have perpetual succession, and shall be capable in law by the council of such borough to do and suffer all Acts which now lawfully they may do and suffer.

By the 92nd section, a borough fund is created, to consist of all the property and hereditaments belonging to the Corporation, the surplus of the income from which, after paying the necessary expenses, is to be applied, under the direction of the Council, "for the public benefit of the inhabitants and the improvement of the borough." If the borough fund be not sufficient to defray the necessary outlay, the Council is authorised to levy a borough rate, but the expenditure of such rate is limited to the payment of the expenses to be incurred in carrying into effect the provisions of this Act.

These enactments constitute the essence of the Charter of self-government conferred upon the boroughs 68 years ago. Those boroughs which possessed corporate property had the means in their hands of improvement and progress. Those which depended on a borough rate were strictly limited to a narrow range of objects contemplated in the Act, principally watching and lighting; the management of the highways was not included in their jurisdiction at that time.

By section 90, power was given to make bye-laws for the good rule and government of the borough, subject to the approval of the Secretary of State. With this exception, however limited their powers might be, the councils were independent in the exercise of them and free from interference by any government board or department. The number of boroughs included in the Act of 1835 was 178, which has been increased by subsequent Charters of incorporation to three hundred and twenty-three in England and Wales. These vary exceedingly in extent and population from three-quarters of a million down to less than two thousand; the population of Hedon is 1010, Montgomery, 1034.

The limited sphere to which the functions of the boroughs were restricted in the Act gave little opportunity for operations of an

aggressive character. At that time public interest had not been roused to the importance of the sanitary measures which have since loomed so large in the public eye. A few of the boroughs which possessed landed estates, or were endowed with revenues from other sources, were enabled to effect public improvements of greater or less importance; but in the majority of cases the means were wanting, and probably the desire did not exist in sufficient strength to overcome the aversion to increased rates. The same remarks will apply to the departments of Art, Science, and Literature, which have more recently put forth their claims to local recognition and support. The great value of Municipal Institutions ought to consist in their concentration and reflection of public opinion in the locality, so as to bring it to bear with the greatest effect on all measures affecting the public interest. Thus it became a fixed opinion that in defending their privileges and protecting the interests of the burgesses, sufficient powers were delegated to them for this purpose. The decisions of the superior Courts, however, circumscribed this power within very narrow limits, and in some cases took it away altogether. As for instance the case of Sheffield decided in June 1871 in the Court of Queen's Bench. This case was a very important one for the borough. A Company brought in a Bill for supplying the town with water, which was opposed by the Town Council on the main ground that it was better for the public interest that the supply should be provided by the municipality. The opposition was unsuccessful, and a rule was applied for to quash the order for the payment of the expenses incurred by the Town Council in their opposition; the judges were unanimous in their decision not to allow the expenses, which therefore fell upon individual members of the Council instead of the Borough fund. Though this was their decision as the law stood, they expressed their sympathy with the Town Council, believing they were actuated by the laudable desire to protect the true interests of the borough. The Lord Chief Justice said—"I very much wish that I could protect them against the expenses which must now fall upon individual members." The Mayor of Batley was provided with a gold chain by the Corporation, the expense of which was disallowed by the Court, and thrown on himself and his friends. The Corporation of Sunderland were mulcted in the expenses incurred on the reception and entertainment of General Grant, the ex-President of the United States.

These and similar cases brought about an alteration of the law by the Borough Funds Act of 1872; in its inception it was a prudent and liberal measure, but in its passage through Parliament the parties interested in preserving their privileges became alarmed, and by using their powerful influence succeeded in the introduction of clauses which completely neutralised the remedies proposed by the original Bill, and so it was provided "that nothing in this Act contained shall authorise any governing body to promote any Bill in Parliament for the establishment of any Gas or Water Works to compete with any existing Gas or Water Company established under any Act of Parliament"—a striking object-lesson and warning, the outcome of the spirit of narrow jealousy and distrust and the formularies to be complied with, such as notice by public advertisements in local newspapers of the meeting of the Council, and the purpose for which it is called, such notice to be in addition to the ordinary notices required for summoning such meeting. When such meeting is held, any resolutions must have the sanction of an absolute majority of the whole governing body. Then there must again be publication in the newspapers, then public meetings, then enquiry by the Local Government Board, then a voting so as to obtain the consent of the owners and ratepayers to sanction the expense in promoting or opposing any Bill in Parliament, all of which the City of Leeds has recently passed through in connection with the proposed extension of its boundaries.

In its working therefore this Act caused considerable dissatisfaction and irritation, as the phrase goes—

It keeps the word of promise to our ear,
And breaks it to our hope.

In most large boroughs, Bills are constantly submitted to Parliament affecting more or less the interests of the town. The cumbrous mode of ascertaining public opinion prescribed by the Borough Funds Act, to which I have alluded, added needlessly to the cost, in many instances to the outlay required. The inconvenience of this state of things was soon felt to be so great that in 1873 an Association was formed embracing a large number of the Corporate Bodies in England, for the purpose of endeavouring to obtain an alteration of the law, so as to give to the municipalities a greater amount of freedom of action.

The course of legislation since that date has become almost

bewildering in the number of local bodies created, and in the variety of enactments to which they are subject.

In regard to boroughs alone, a very large number of additional Acts have been passed, all of which are still in force. The changes which have taken place within the generation that is passing away! The unexampled career of prosperity brought with it new wants. The requirements of modern society have assumed a complication and awakened an interest which has called for the interference of law in many departments never previously interfered with.

This has been provided for as circumstances arose, each case being decided on its own merits with a chivalrous disregard of previous legislation on parallel lines. Thus, we have Sanitary Acts, Burial Acts, Factory Acts, Workshop Acts, Baths and Washhouses Acts, Education Acts, Public Library Acts, Lodging House Acts, Vaccination Acts, Contagious Diseases Acts, both for men and animals, Adulteration of Food Acts, Pharmacy Acts, Alkali Works Acts, Smoke Acts, Inebriates Acts, Quarantine Acts—all requiring local machinery; the areas over which they range, their mode of administration, and the bodies to whom they are entrusted overlapping, intermingling, and exhibiting all manner of confusion and diversity.

Some consolidation took place by the passing of the Health of Towns Act in 1875, but the multitude of separate and frequently conflicting local authorities acting under separate enactments still continues.

In 1877 an elaborate Memorandum on Local Government was prepared under the supervision and at the expense of the late William Rathbone, M.P., and Samuel Whitbread, M.P. This was an exhaustive review of the existing organisation of local government in England. The following extracts will indicate the conclusions at which these gentlemen arrived, and the line on which any improvement should, in their opinion, be laid down:—

“The increase in population and in the requirements of the time has outgrown the capacity of local machinery created for more limited objects. The greatly increased duties thrown upon local bodies, and their powers to tax and incur debt, make it necessary that the local organisation should be simplified and strengthened.”

“The main cause of defectiveness of the existing organisation seems to be the complication of the areas into which the country

is sub-divided for the different purposes of administration. This complication operates injuriously in two ways. In the first place, it involves the concurrent existence of a number of distinct governing bodies independent of each other, and conflicting sometimes in interest or policy. If one simple unit of local government were adopted for all purposes, there would be a single governing body, elected at one time and in one manner, and by one constituency; and this body, by itself, or by its committees, would manage all the affairs of the locality on consistent principles; its proceedings would be subject to effective control by the ratepayers; and it would have one budget of expenditure and debt for the whole locality. In the second place, the same cause prevents the ratepayer from seeing or controlling the total of the indebtedness by which he may be affected. Parliament may see the growth of the local indebtedness of the country as a whole, but they cannot control it. The ratepayer alone could control its growth as it proceeds, but he cannot see it. The various debts which affect him are contracted by different authorities for areas which are not conterminous. The evil of growing indebtedness must be dealt with locally; but it cannot be so dealt with until its existence and its probable results have been brought home to the ratepayer, and they cannot be brought home to the ratepayer without a simplification of areas and of governing bodies. This seems to be the first condition of improvement."

Again—"and it is said, and it seems to be beyond question, that by reason of the defects which have been described, the machinery of local government works with waste and difficulty and without proper effect; that some of the most capable men are deterred from taking their proper part in it; that by reason of the unfairness of taxation private interests are unnecessarily aroused by public improvement; and that local indebtedness is so broken up and incurred in so divided a responsibility, that its growth, which can only be checked locally, is not known locally, and could not be effectively resisted even if it were known.'

The confusion, mismanagement and waste arising from the multiplicity of these conflicting jurisdictions created a settled conviction that local government still needed much amendment, and so we come down to our own day of County Councils, District Councils, Urban District Councils, and Parish Councils, superseding and consolidating the previous enactments to which I have already referred, brought about by the Local Government Act of

1888. Besides the London County Council, consisting of 138 members, and having jurisdiction over the district previously governed by the Metropolitan Board of Works, there are about sixty County Boroughs in England and Wales, in which municipal trading is in force in a more or less degree.

We have not yet, however, reached a system that can be considered perfect in local government. Owing to our comparative freedom from central authority, that is government in London, our old divisions of counties, townships and parishes, to say nothing of Poor Law Unions, have rendered exceedingly difficult the simplification of local government, for whilst, as I have already pointed out, Municipal Corporations now possess a good deal of freedom and independence, overlapping authorities like Boards of Guardians and Burial Boards are still under the control of the department in London known as the Local Government Board. Their accounts are audited by the district auditor appointed by the Local Government Board, and he has power to disallow expenditure subject to an appeal to the Government Department. No such control is exercised over the accounts of the Municipal Corporations, and thus they possess greater powers than the Local Board. This, therefore, will be one of the difficulties with which we shall be met when we come to discuss the advantage or otherwise of Municipal Trading in its relation to Fire Insurance.

In order to appreciate this more clearly we will enquire for a moment or two into the various undertakings that are looked upon as legitimate objects of government apart from what we understand by trading profit, in such cities and towns as Liverpool, Nottingham, Manchester, Birmingham, Leeds, Bradford, and Newcastle-on-Tyne, and we find there are departments and committees for education from the elementary school to the college; health, including the supervising of sanitary conditions and the provision of isolation in cases of infectious diseases; highways, which include street improvements and building regulations; lighting by gas and electricity; libraries, including picture galleries and museums; lunatic asylums, including the care of inebriates under the Act of 1898; Hospitals; property, such as Town Halls, Municipal and other buildings; parks and pleasure grounds; prisons; reformatories and industrial schools; sanitary, including ashpit cleansing and destructors; sewerage, including sewage disposal works; watching, that is police and fire brigade; and weights and measures; and it may be said that only in a minor degree do the

Town Halls bring in revenue in the shape of rent for their occasional use for concerts and the like, and the Fire Brigade for assistance outside their boundaries, and where they have power by Local Act to charge individual ratepayers for the use of their equipment—otherwise the funds for the carrying out of this long list of legitimate duties are provided by the ratepayer. This, many people consider a sufficient task in itself to be efficiently supervised by a body of men whose services to their communities are of a voluntary character.

We come now to those departments of municipal trading which have from time to time been added to the above-described duties in the interest of the ratepayer, and which it is argued can be better carried out than by individual traders or companies of traders. The supply of Baths and Washhouses, Cemeteries, Electricity and Gas, Harbours and Piers, Markets, Tramways, Water, Working-class Dwellings, some of which are worked at a loss, some at a profit—those worked at a profit are Water, Gas and Electric Light Supply, Tramways, and Markets; those worked at a loss, Baths and Washhouses (looked upon by many as a sanitary safeguard, and not as a profit-making department), Cemeteries, Working-class Dwellings, and Piers. By a return called for by Sir Henry Fowler in the House of Commons in the Session of 1891, the average annual loss on these undertakings in Municipal Boroughs alone is £150,000. In addition to the latter undertakings there are others, not given in the return, like slaughterhouses, allotments, harbours, &c., which, as a rule, make a loss also. What justification is there for calling these undertakings "Trading Enterprises"? If they were such they would have ceased to exist long ago. In reality the Local Authority supplies these Institutions at the general expense; it would at least be equitable to arrange charges which would cover expenses, but the figures quoted show that we are yet a long way off the desired haven.

Those of us who are in the habit of following the proceedings of our City Councils will have observed the marked difference of opinion as to the manner in which these profits are earned and the method of disposal of them. Some people declare that profits should be applied in relief of general rates and not of particular interests. A certain town makes a large profit out of gas, and in one of the Committees of Parliament in 1898, a prominent manufacturer spoke very bitterly of the feeling of the large gas consumers,

that they were charged unduly for their gas in order that the rates might be relieved. He stated that the profit on the gas was sufficient to defray the entire cost of the Technical University, so that the large manufacturers were compelled to provide lavish educational facilities for the town out of their own pockets for no reason except that they were, for the purposes of their business, the largest gas consumers. In fact, such a process is, they complain, stealing from the rich to give to the poor.

In another town the Corporation realised a handsome profit out of the working of the tramways, and proposed to appropriate £12,000 out of this profit to reduce the amount, which otherwise would have to be levied, by increasing the general district rate by two pence in the pound. But the working-class, who live along the tramway route, are up in arms at this proposal. They say that they are practically the sole users of the tramway, that a lowering of the district rate means hardly anything to them, that the people who will benefit by that will be the rich property owners. In fact, that such an appropriation of the profit means a stealing from the poor to give to the rich. Birmingham, for instance, during six years applied £200,000 out of profits of its gasworks to improvement schemes, though the profits of gasworks are earned by the whole community, while improvement schemes benefit a limited number. Hull, I see, during the five years their electric trams have been running, paid out of profits £37,183 for interest on borrowed capital, and £33,740 for sinking fund, and contributed £62,000 towards the reduction of the rates. In the accounts for the financial year of 1902-3 of the Leeds Corporation, the City Fund was credited with water profits £14,500, tramway profits £47,000, a total of £61,500. The net profit on the sale of electricity was £14,255, out of which £12,871 was set aside for the redemption of the debt, leaving a surplus of £1383. The net profit from gas was £35,278, £24,260 was taken off for redemption fund, leaving a surplus of £11,018, but the deficiency in the previous year of £2197, left a net balance of £8820. These balances of £1383 and £8820 were not appropriated, but carried to the following year.

Now, let us look for a minute or two at the arguments in favour of Municipal Trading of this character, and something that may be said against it.

It is said that a public authority can raise money more easily and cheaply than a private company can, and that, therefore, to

leave large undertakings in private hands is to sacrifice an economical advantage. I do not think this a very sound argument. Nothing for nothing is a good rule. Depend upon it, the astute persons who finance public loans take care to exact full market value of the risk they take. If the public authority pays less for money than a private company would, it is because the authority undertakes a higher obligation. The obligations of a company are devoid of personal responsibility, while the ratepayer has to pay his loan independently of the success or failure of the undertaking, and is in fact a shareholder in an unlimited concern. Further, the present credit of the local bodies is to a large extent the product of accidental circumstances. It is not due to any improvement in the financial condition of the bodies themselves, because no such improvement has taken place. Taxation is higher and capital burdens heavier. The consequence is, Municipal credit is weakening. It is only a few years ago when Municipal loans were eagerly taken up at from $2\frac{1}{2}$ to 3 per cent. Now our newspapers tell us by advertisement that our large towns are eager to pay $3\frac{1}{2}$ per cent. for loans for long or short periods, the natural outcome of the enormous amount of Municipal as well as Government loans that have been issued to the public in the last ten years.

Another argument is, that if a profit can be made out of the general supply of some commodity for the community, why should not the community realise that profit for itself? But the great difficulty of a Corporation engaging in a trade is to hold the balance evenly between the ratepayer as proprietor of the Corporation works and the ratepayer as consumer. The two are not by any means identical, as illustrated in the instances above quoted; for, assuming profit was not to be made on gas or tramways, the ratepayer who does not use gas or does not use the tramway is burdened with an additional capital debt for the purpose of subsidising his neighbour, who has commercial needs that do not affect him. A very glaring example of this is the electricity works of a large city where the customers only number 4000, whereas the entire population of 700,000 people is laid under contribution or liability to provide the capital and keep the works going, a disproportion which is surely a strong argument for the immediate disestablishment of electricity from Municipal control.

There is another contention of the advocates of Municipalism,

that the motives of private adventure are self-seeking and sordid, and contrast unfavourably with the disinterestedness of the Town Council. There is a great deal of cant or, at best, ignorance in this cry. Where is the inherent beneficence or nobility in those who merely adventure other people's money? On the other hand, no one who has seen the carrying out of a great public undertaking by private enterprise can have failed to be impressed by the high degree of courage, steadfastness in adversity, tenacity of purpose, faith and loyalty which is required to steer it through the troubled waters of its early career. It is a mistake to attribute the motives of such individual adventure merely to pecuniary interest. The pleasure of completing a great work of public utility, and of deserving public fame, also enter largely into such motives.

Further, it is sometimes urged that certain fields of commerce are necessarily monopolies, and that it is better that the Government should be a monopolist than a private person. There is some reason for this in such a case as the public supply of water, which, as a matter of common necessity and one connected with vital questions of public health, may well be entrusted to the management of civic officers, more especially as it cannot possibly be replaced by another article.

But in other matters this cry of monopoly is only a pretence by which people are induced to concur in the municipalisation of various undertakings. That such concerns are bound to become monopolies in the hands of the Corporation may be admitted, for the whole power and authority of that body is used to defend them as such, and to prevent anyone else conducting a competing trade, which, but for the Corporation, they would be entitled to do, but to say that they are monopolies when they are in private hands is an abuse of the term. They are only monopolies so long as, by reason of their efficient service, or of the apathy of the community, the public do not choose to make the effort necessary to establish a rival undertaking.

The private capitalist in any branch of industry which is of a mobile character, who understands his own business, and is free to conduct it in his own way without having to reckon with the opinions of a host of other people who know nothing about it, must have an incalculable advantage.

Surely, therefore, the Corporations would be well-advised to confine their functions to those important public matters in which

all their constituents are equally interested, and which must of their nature be performed by the ratepayers in common, and which involve no taint of partiality or suspicion of class bribery, such as the administration of justice and police, the care of the public health, the provision of parks and open spaces. Let them leave to private enterprise whatever private enterprise will undertake, keeping themselves in an impartial position so that they may secure the unsuspecting loyalty and obedience of all the traders to the regulations which they impose upon them for the protection of the common interest. Let them adhere to the doctrine affirmed by eminent jurists—"that the sole and only legitimate end of government is to protect the citizen in the enjoyment of life, liberty, and property, and when the Government assumes other functions it is usurpation and oppression."

At this point I should like to show the effect financially of the gradual growth of the Municipal indebtedness. I will take, by way of contrast, the National or Imperial Debt, which was in 1878 £775,000,000, reduced in 1897 to £641,000,000—a reduction of £134,000,000. In the same period the local debt was in 1878 £113,000,000; it rose to £245,000,000 in 1897—an increase of £132,000,000 in twenty years. The local debt has increased 120 per cent., and the annual amount of local taxation 77 per cent., against an increase in the population of 23½ per cent. and in the rateable value of property of 26½ per cent. Up to June last year the whole indebtedness of the local authorities in England and Wales is net £305,445,994.

In Manchester the Imperial Debt per head is £16 6s. 9d., but the Citizens' Debt to the municipality is £29 1s. 4d. The National Debt per head in Leeds is, as in Manchester, £16 6s. 9d., the local debt is £11 10s. I should like to enlarge on the significance of these figures, but I must pass on to the consideration of the claim put forward by the strenuous advocates of Municipal trading to still further include in their enterprises the perilous task of Fire Insurance, not only of their own corporate property but the property also of the ratepayers within their jurisdiction.

The proposal recently made by a number of merchants and property owners in what is known as the "Cripplegate District" of London to the city authorities, that they should take up Fire Insurance of the buildings within that area, is only a repetition of many similar requests put forward during the last twenty years, just as we have, now and then, advocates for the taking over of

the railways in this country and work them as a Government department ; such advocates are no nearer the realisation of their schemes, the common-sense of the nation being too much in evidence. They cause commotion, it is true—a councillor of great eloquence makes a speech which carries the whole Council with him, and for a time the matter is in every one's mind and is looked upon favourably by many people, but later, when that policy is to be continued, that gentleman is not there, and somebody else gets up of equal eloquence on the other side, and the whole policy is reversed. How often have we seen this lack of continuity displayed by such bodies ! But let us suppose a Corporation, acting upon imperfect knowledge, decides to trade in Fire Insurance. The town that has made the nearest approach to the idea, so far as I have observed, without undertaking, for want of time, any research, is Bradford ; the Corporation are providing a reserve fund to meet losses to their own property only, which is perhaps the next step to trading in Fire Insurance. We will therefore assume that Bradford is the pioneer in this undertaking, and examine its procedure. First, there will be the preparation of a Bill for presentation to Parliament to obtain the powers necessary. The usual cumbrous and expensive preliminaries, as already described, gone through, down to the inquiry on the spot by a representative of the Board of Trade ; powers are granted, a capital debt is created, or, as likely as not, a sum is set aside out of surpluses as an Insurance Fund, just as Glasgow Corporation in 1898 obtained a Bill giving them powers to start an Insurance Fund, though we have no evidence of anything having yet been done. If the latter course is adopted, years must elapse before the Council could create an adequate Insurance Fund out of the premiums. There are two practical illustrations of this handy for my present purpose. The Swedish Government Insurance Institution was unable to meet its losses at Alesund, and a loan of £300,000 has to be raised. The State of Wisconsin, with an Insurance Fund started last year of £1200, has to meet a loss on the Capitol building destroyed by fire of about £160,000. An Insurance Department will be set up, managed by a Committee of the Corporation, and it is reasonable to suppose an expert in Fire Insurance would be called in, in a similar manner to the undertakings of gas, electricity, water, tramways, and the like, with a staff of surveyors and clerks, the Insurance Fund to be kept distinct from all others, separately invested, separate

accounts kept and audited by a professional accountant specially designated for the purpose, the Insurance Department to discharge all its obligations out of its own resources, any suggestion of falling back on the rates in case of a probable emergency not admitted, for the probability is a clause would be inserted in the Bill disallowing a resort to the rates to make up any deficiency, on the plea that the local indebtedness had already become disproportionate to the rate of increase of population and of rateable value—obviously this game of speculation by local authority must be made to pay its way. We must remember the claim to undertake Fire Insurance is based on the belief that Insurance Companies make unfair profits, that Municipal authorities can work the business more economically, serve the citizens better, and appropriate profits for the benefit of the community as a whole. The lean years are never to be in evidence, Utopia in the shape of big profits the everlasting law. But even Bradford hesitates to carry on its own shoulders the entire risk of its own property, much less the entire risk of the town, because when the Council resolved to throw on its own reserve fund of £20,000 the insurance of £30,000 to cover its new conditioning house, the Insurance Sub-Committee immediately passed a resolution declining for the future to take any single larger risk than £5000—a sub-committee nullifying a resolution of its own Council. Why? Because the Council collectively, by reason of its inexperience, could not see that its action was impolitic and the wiser sub-committee did.

We have, however, got the machinery into working order. The area of operations is to be fixed, bringing the inclusion or exclusion of overlapping and intermingling areas into discussion, the reason why one should be taken, the other left. The acceptance of proposals on all properties, the inherent and moral hazard, without discrimination of risk—seeing that every citizen or ratepayer has an equal right to go to the Corporation for his insurance—a factor that must not be ignored, the regulation of rate, when every man declares there is no risk in his mill or warehouse or shop, as the case may be, a plea with which we are all very familiar. I wish I could say here that this part of the business would be carried out in strict honesty, impartiality, and without fear or favour. It is delicate ground, for there is a strong tendency in human nature to be liberal with other people's money. The temptation would be very great in dealing

with Fire Insurance both on the premium side and the loss side of the subject, because there are so many and sometimes subtle influences that can be brought to bear, and used without scruple. Recently I heard a city councillor, in responding at a dinner to the toast of "The Corporation," express the opinion that the members of that body were free from corruption. If he meant that the councillors were free from the suspicion that they served the city without looking for pecuniary reward for themselves, his remark may be accepted as in the main accurate, but it was just one of those half-truths that suited the occasion. Have we not the authority of Lord George Hamilton that it was the business of the Tory party to look after their friends, and are we to suppose city councillors, Tory and Radical alike, are made of sterner stuff? My experience leads me to the contrary conclusion, and I am satisfied that the business of Fire Insurance undertaken by the Councils would lend itself to favouritism and undue leniency. There is not the same inducement to economy and wise administration when the business is organised under the control of a small community; in the nature of things there is always a tendency to play into one another's hands, for councillors all know each other, and the principle—well-recognised to-day—of giving contracts for work under the Council in the locality would be equally strong when dealing with Fire Insurance without any intention of corruption, for the strongest advocates of municipal control cannot but admit that abuses creep into public departments. I have found this in my limited experience to be so. Then, again, the members of a community are also voters, and there is a tendency on the part of a representative to make things pleasant for those who elected him. I recently had an amusing experience of this. When inquiring from a councillor of long standing if he was on the Lighting Committee, the answer was, "No!" and on explaining the reason of my inquiry, he at once said — "Write to Councillor So-and-so, he comes out this November; he will see about the lamps for you." That councillor, I should explain, was seeking re-election. The difficulties on practical and moral grounds would be great, and we, with our experience to guide us, would look for speedy collapse; because, though there may be plain sailing for a time, the numberless instances of huge sums paid for loss in our great cities, from the time of the great fire in London in 1666—when 13,000 houses, 89 churches, including St. Paul's Cathedral, and property to the

amount of £10,000,000 sterling was destroyed—to our own day, would sooner or later be the experience of Bradford. Many lessons have been learnt of what fire can do in Bradford as well as in other and larger cities, and the conclusion to be arrived at is, that Corporations have already gone too fast in trading enterprise, when the present total local debt has reached the large sum of £300,000,000, to make a further venture in the domain of Fire Insurance with any possibility of success.

Little need be said on the question of limits. We all know what an important part this question plays in sound and successful underwriting. The advocates of Municipal Fire Insurance who at frequent intervals bring themselves into public view, evidently imagine that the exposure to fire hazard and the necessary limitation of amount of loss in any one fire can be entirely disregarded; the limit difficulty is never faced, is, in fact, never even thought of. Again, their proposal assumes that the Fire Offices receive huge sums in premium and pay out a very small part of this in losses. We are led to draw this conclusion because whichever district takes on this idea, figures are always presented like that of Eastbourne, when at a meeting of municipal authorities of the Sussex towns in December, 1902, it was stated that during the last ten years "not less than £10,000 had been annually sent out of Eastbourne in fire premiums, but they had not received more than an average of £1550 a year in the shape of compensation"; therefore, Insurance Companies are making profits all the time. Let us hope Eastbourne will not have a similar experience to Eccles and Patricroft, when two of its prominent citizens in October, 1902, advocated Municipal Insurance in the columns of the "*Manchester City News*," one gentleman contending that a rate of three-halfpence, the other twopence halfpenny in the £ on the rateable value would be sufficient to meet the losses in that district. These rates would produce £850 and £1416 respectively. In the month following a fire occurred in Patricroft causing a loss of £55,000. I invite a young member to calculate how long it would take to provide for this loss at these figures. With this object lesson of the worthy citizens above mentioned, it may be said that while they were yet musing the fire burned.

To go no further back than the beginning of this century, and confining our review to England and Scotland only, the following are a few of the single fires of a serious character that have

occurred:—(1900) Kidderminster £40,000, Ipswich £40,000, Glasgow £100,000; (1901) Leicester £40,000, Manchester £58,000, Rushden £130,000; (1902) Dublin £130,000, Nottingham £100,000, Coatbridge £50,000, Suffolk £40,000, Barbican, London, £250,000, Plymouth £65,000, Manchester £120,000, Bolton £27,000, London £200,000, Leyburn £31,000, Stockport £57,000. I do not attempt a complete list; these are entirely sufficient to remind the supporters of Fire Insurance enterprise as a municipal undertaking of the hazards of the business they would boldly venture.

We are all aware of the mistaken notion as to the profits of the business. The history of all the strong Companies of to-day is a record of careful and progressive management with many ups and downs, and yet during the last five years the balance of trading by the Tariff Offices is under five per cent.; surely with so small a margin as this it is ridiculous for bodies having such large interests and responsibilities of other kinds to seriously entertain proposals of this nature.

Though I have by no means exhausted the subject, I must have regard to your patience and bring my remarks to a close, with the opinion that it is preferable that certain wants of the community are best supplied by private enterprise, for it ought to be kept in mind that the Empire has been made not by either the Municipal or State Government, but by private enterprise. In a recent letter to the "Times," Sir Edward Fry says—"What is it that has made Englishmen what they are but their passion for individual freedom, their habit of acting on their own judgment and their own initiation, and their dislike, I may say their scorn, for the leading-strings of official authority," and municipalities may well pause before undertaking and competing with Fire Insurance Companies; they have more work than they can undertake to efficiently perform; for commerce plays to-day a larger part in our life and movements than it ever did before, and occupies men's minds more than it ever did before; and it cannot be pretended that a committee of councillors can give proper attention to so difficult a business, one which requires the greatest skill and aptitude to bring it to a successful issue. As a trading enterprise we have to-day evidence of many successes, there have been also many failures. Looking at the long list of Companies which have ceased to exist since 1880, and which have lost nearly £3,000,000 of shareholders' money in the attempt to establish

themselves, we may consider Municipal Fire Insurance as a pious aspiration. It is even yet no more than an ideal, it has never assumed a practical form. It has an imposing sound, but probably no two of its advocates are agreed as to its scope and limitations, and as an active factor in our municipal life it may be dismissed as unlikely of realisation.

For the statistical and other references I am indebted to a paper read before the Society of Arts in January, 1899, by Mr. W. H. Davies.

OLD AGE PENSIONS.

By DUNCAN C. FRASER, M.A., F.I.A.

A Paper read before the Insurance Institute of Newcastle-upon-Tyne, January 22, 1904.

THE object of this paper is to give some account of the actual working of Old Age Pensions in the Colonies of New Zealand, Victoria, and New South Wales, and in Germany; and to discuss very briefly the state of the question in our own country.

I.—NEW ZEALAND.

White population, 31st March, 1901,	-	-	772,719
Number over 65,	-	-	31,353

In New Zealand the question of Old Age Pensions first entered into practical politics when, in 1896, Mr. Seddon, the Prime Minister of the Colony, brought a Bill before Parliament containing a Pension Scheme. That Bill did not pass, but it served the purpose of indicating the attitude of the Government on the question, and in the General Election which followed almost immediately, it formed one of the leading issues. Mr. Seddon obtained a new lease of power, and in 1898 he carried a measure through Parliament which provided that Old Age Pensions should come into operation on the 1st November of that year, powers being taken for three years only.

The preamble of the Act sets forth that "it is equitable that *deserving* persons who, during the prime of life, have helped to bear the public burdens of the colony by the payment of taxes, and to open up its resources by their labour and skill, should receive from the colony a pension in their old age."

Anyone over sixty-five who has resided twenty-five years in the colony, and whose income is less than £52 a year, is entitled to a

pension if *deserving* and not an alien or Asiatic; but what does *deserving* mean? The law requires a sober and respectable life during the last five years before the pension is claimed, and an examination of the provisions of the Act shows that a man, or woman, may become a pensioner who has been drunk and disreputable, providing these eccentricities have not been in evidence for five years; that the applicant may have been in prison for as long as five years for a dishonourable crime and still be eligible if the imprisonment was twenty-five years before; or that he may have been imprisoned four times for offences punishable by twelve months' imprisonment and not be debarred if the latest incarceration is twelve years past.

Practically, we may take it that every poor person who is qualified by age and residence, and is not notoriously criminal or disreputable, is entitled to a pension.

The Act regards an income of £52 a year, or £1 a week, as sufficient provision, but looks upon a smaller income as indicating comparative need, and provides, therefore, that it should be supplemented. The assistance is given on such a scale that an income of £34 a year, or over, is made up to exactly £52. Those who have less than £34 are given the full maximum amount of pension, which is £18 a year. Persons who have no income may perhaps have property of some value, such as a house and farm. If the property does not exceed £50 in value the full pension of £18 is given; but after the first £50, every additional £15 of value takes £1 a year off the pension. The effect is that property to the value of £320 completely disqualifies for pension.

To obtain an Old Age Pension the necessary claim-form must be procured from the nearest post-office, filled up and handed to a local official. It is passed on by him to the stipendiary magistrate, who fixes a day for hearing the claim in open court, when, if the evidence is satisfactory, a certificate is granted which entitles the claimant to draw the pension monthly from a specified post-office. The certificate is good for one year only, and at the end of the year a fresh application has to be made and a new certificate obtained. Some actual cases may be quoted to illustrate the operation of the Act.

A man from one of the benevolent homes, which in New Zealand take the place of our workhouses, when asked if he had ever been in prison, replied ostentatiously, "Yes, for thieving." This old fellow had walked off in the clothes given him by the

institution, and had been brought back and jailed, just to make an example to prevent others doing likewise. He was allowed the full pension.

There was a case of retribution, long delayed, but sure. A widow in her application had stated her age as sixty-seven, but according to her second marriage certificate, which she had to produce, she was only sixty-four. The Court informed her that she could not be sixty-four to be married and sixty-seven to be pensioned at one and the same time, and the too youthful widow was told to wait.

In another case a birth certificate tendered in evidence to fix the age of a woman showed to the quick eye of the judge an alteration in one of the figures. The deputy wired to the district officer for the exact figures. The information was returned and the lady lost her annuity.

An applicant who had £100 in the savings bank applied for and obtained pension. If the amount had been only £50 he would have been entitled to the full pension of £18. As in this case there was an excess of £50 over the £50 allowed, and this £50 contains three complete sums of £15, there was a deduction of £3. This left him £15 of pension, which he was duly awarded.

"You are not entitled to a pension," the judge said to one applicant, "your income last year was over £1 a week."

"Thank you, sir," the man said as he stepped down; "it shall not happen again."

This illustrates an important feature of the Act. The pension is a right, quite irrespective of the ability of the applicant to provide for himself. A healthy man of sixty-five who is in regular employment is quite at liberty to take steps to qualify for pension by the simple process of ceasing to work.

In Christchurch the case of a woman whose husband was earning £78 a year came before the court. In considering an application from a married woman for pension the income of the husband was halved between himself and his wife, so that the annual income of each was considered, for the purposes of the Act, to be £39. They were therefore both entitled to a pension of £13, making their total income, private and public, £52 a year each, or £104 for the two.

"A nice little income, truly," said the judge.

A man who admitted that he had drawn over £50 of his money out of the savings bank and given it away, "as he thought that

he had too much money," was rejected on the ground that he had deprived himself of property in order to qualify.

Some novel questions arose between the inmates of the benevolent homes who receive pensions and the authorities.

In Hawera a number of inmates of the Old Men's Home were granted pensions and immediately asserted their independence. They demanded better treatment than the other inmates because they were no longer paupers; they were paying their way. The manager coaxed and threatened without avail. The chairman of the Board was then appealed to; he visited the Home, and as the result of his investigations the rebellious pensioners were expelled; to be re-admitted, no doubt, in due course on terms of unconditional surrender.

The Act provided that Maories should be eligible for pensions, but this privilege was refused to Asiatics. The pensions are highly popular among the natives. Thirty shillings a month is wealth, and the old men of the tribe are once more persons of consideration. On the monthly pay-day they are escorted to the post-office by all the young men of the neighbourhood, who take charge of the money after it has been collected, and celebrate the occasion as a monthly festival.

The population of New Zealand is about 800,000—not much more than that of Liverpool. Mr. Seddon calculated that there were 5000 persons entitled to pension, and that the maximum sum required would be £90,000 a year. But five months after the passing of the Act there were pensions to the amount of £128,000 on the books; in another twelve months they amounted to £193,000; and in another year to £211,000, that being the figure at 31st March, 1901. For the next two years the amount was practically stationary, and the number of pensioners was between 12,000 and 13,000, which was equal to 50 per cent. of the population over sixty-five years of age and resident over twenty-five years in the colony, and was $2\frac{1}{2}$ times Mr. Seddon's estimate.

It was evident very soon after the Act was put into operation that large numbers of people had been granted pensions who were not properly entitled.

The fact is there were not sufficient securities against fraud in the Act. As regards age, the evidence in the case of white people would seldom be unsatisfactory, since a claimant had to prove his age in court by producing a certificate of birth or other

sufficient evidence. But as an example of what happens in the case of natives, it is stated that in one district the only evidence as to the age of persons of sixty-five and over was the word of a native preacher aged under forty.

The claimant had to give sworn evidence as to income and property and to produce witnesses to support him. But there was no sifting or cross-examination of the evidence, and very naturally the value of any property was stated at an exceedingly low figure.

Parents handed over their property to children and swore in court that they had no property and no income. On the other hand children in good circumstances took advantage of the law to relieve themselves from the burden of supporting parents and sent them into court to claim pensions; and the law gave the magistrate no right to enquire as to the means of the children.

In 1900 the Act was made permanent and some amendments were introduced. It was provided, for example, that the joint income of husband and wife should not exceed £78 with the pension. In 1901 another amending Act was introduced by Mr. Seddon. This Act provided that a Government officer should appear in court; that he might examine the applicant and his witnesses; that he should have power to summons bank officers to appear and give evidence as to means; and that the questions put to such officers must be answered.

In his speech moving the second reading of the amending Act of 1901 Mr. Seddon in a speech of very great candour commented on the wholesale undervaluing of property in connection with applications for pensions, and frankly admitted the existence of a certain amount of fraud. He said:—

“I have had cases brought before me where the magistrates, owing to their time being limited and to the fact that they have had to catch steamers and trains, have cut short their questions to the applicant. I will quote a typical case that has been brought under my notice. It was the case of an application from a Maori, and the Maori interpreter is brought up and the magistrate enquires—‘What you have told the interpreter is true?’ The answer was ‘Yes’ and then the pension was granted.

“I had a letter a couple of days ago from Christchurch. The wife of a pensioner died after the Act was passed; putting the two properties together, she had £600 in the bank. There is

another case on the west coast where a pensioner died who had £500 in the bank.

"One case was given to me by a member the other day, which was known to himself, where an old couple divested themselves of a farm, gave it to a daughter who is married, and after this was fixed up applied for a pension; and they now live with the daughter on the land that was their own, and they drive in in a pony-chaise once a month to draw the money."

Mr. W. P. Reeves, the Agent-General for New Zealand in London, says in his book on "State Experiments in Australia and New Zealand" that "there can be little doubt that a large portion of the £200,000 to be found by the New Zealand Treasury under the Pensions Act will go towards lowering the sums found by the children of the poor to the support of their aged relatives."

It must be remembered, however, that the children of the poor are not necessarily poor themselves, and it was proposed by the amending Act last referred to that enquiries should be instituted into the circumstances of children, but there was such a strong opposition to this salutary provision that it was dropped. Mr. Seddon remarked apologetically that he really did think in several cases which had been brought under the notice of Government where children were wealthy or well-to-do, that they had forgotten their filial obligations.

The following statistics summarise the working of Old Age Pensions in New Zealand up to date:—

YEAR ENDING 31ST MARCH.	1899.	1900.	1901.	1902.	1903.
Number granted, . . .	7,487	4,699	2,227	1,694	1,396
Deaths,	38	786	815	935	1,064
Cancellations, . . .	6	65	227	206	344
Lapses,	—	6	65	182	278
Number in force at end of year, }	7,443	11,285	12,405	12,776	12,486
Amount payable per annum, }	£128,082	£193,718	£211,965	£217,192	£211,594

II.—VICTORIA.

Population at 31st March, 1901,	-	-	-	1,201,070
Number over 65,	-	-	-	66,051

A Royal Commission was appointed to consider the question of Old Age Pensions in 1897 and presented its report the following year. The report recommended that the aged poor should be divided into two classes—the Deserving Poor, *i.e.*, those who had exercised care and prudence, had been of good conduct, and had shown a spirit of self-help; and the Less Deserving Poor, *i.e.*, the intemperate, extravagant, improvident, and lawless; and that the former class should have Old Age Pensions of an amount sufficient to raise their incomes to 10s. per week, while the latter class should be provided for in institutions under State supervision at an average cost of 5s. per week. In other words, we may say that the Deserving Poor were to be granted a liberal measure of out-door relief and that the Less Deserving were to be offered the workhouse. It was estimated that if the pension age was fixed at sixty, and if cases of destitution under the age of sixty, arising from permanent incapacity due to sickness or accident, were also included, then 5500 pensioners would have to be provided for at a cost of about £90,000 a year.

Soon after the presentation of this report the New Zealand Act came into operation, and the Victorian Government resolved to adopt the New Zealand system in preference to the recommendations of their own Royal Commission. The first Victorian Act was passed in December, 1900, and was a temporary measure to have force for six months only. It provided that on and after New Year's Day, 1901, every Victorian who had lived twenty years in the colony and was at least sixty-five years of age and poor, might apply to a police magistrate or justice of the peace for a pension by making a statutory declaration of the facts aforesaid. If satisfied of his poverty and decent behaviour in the past, the magistrates might grant him such allowance, not exceeding 10s. a week, as seemed needful to supplement any sum the applicant owned or earned. Persons of less than sixty-five years might also claim pensions on the ground that their health had been ruined by working in mines or at some other unhealthy trade.

The estimate of the cost for the half-year was so sanguine that the Government only took authority to spend £75,000. As it turned out applications streamed in from the first week, and the

sum actually spent in six months was £131,000. The Ministry had taken alarm at the rush of claims and issued confidential instructions to the magistrates to cut down pensions as much as possible ; but in four months 15,000 pensions were granted for nearly £300,000, and many more claims were waiting for consideration.

A large number of deserving and destitute old persons applied for and received pensions, and so far the Act fulfilled its intended purpose. But, in addition, a considerable number of persons were allotted pensions who had sons in comfortable circumstances and able to support them. The following signed letter appeared in the *Melbourne Argus* on the 8th February, 1901 :—

“SIR,—Yesterday I was a witness for an old lady of eighty-two who was granted a pension of 8s. a week. For more than forty years she has been a worthy, respected citizen of Melbourne, where, a widow, she has reared by her own brave exertions a family, three of whom occupy positions in this city of much comfort and some consideration. For several years she was a tenant of mine, but her class of business went out of fashion ; she grew old, sickly and poor. After she left I learnt that she was destitute, if not starving. She told me that her children pretended to believe that she was only feigning to be poor and they made that their excuse for deserting her. I wrote a kindly letter to the son, who called upon me. He was not in the least troubled about his mother's destitution, but said crossly that she shrank from him, and that he believed she had secrets which she seemed unwilling to impart to him. All I could get out of him was that he would see about it. He has not yet, however, seen distinctly enough to give her any help whatever. One married daughter ignores so vulgar a subject altogether, and the other, who lives in considerable style, certainly for a few weeks did give the poor old soul 3s. a week to pay for a room, but she has now stopped it because she says her mother was rude to her.

“Many old-age pensioners and old people in the Benevolent Asylum and Immigrants' Home could tell tales almost as shameful. I know of several myself, especially of one well-known old Melbourne identity, now already dying in the Immigrants' Home of paralysis, whose wife and daughters are persons of no small style, and whose son is a person of good standing in Melbourne. I have begged them to afford him at least some little comforts, but they ‘pass by on the other side.’

"Parents are technically obliged to support their children, and surely children, when able, should be legally compelled to support their destitute parents, or to sign statutory declarations with satisfactory reasons if they are unable to do so.

"Yours, etc.,

"7th February."

"FREDERICK TATE.

This letter clearly indicates one of the imperfections of the Victorian Act. The Act gave the Court no power to enquire into the circumstances of any relatives except husband and wife. Personal inability to earn a living was the only matter on which the magistrates had to be satisfied.

The following extract from the same paper brings out another imperfection. The *Argus*, on the 5th February, 1901, said:—

"Despite the care exercised in investigating claims, it is becoming evident that the solicitude for applicants which insists upon *private enquiry* is playing into the hands of unworthy claimants. About a fortnight ago one of the first batch of pensioners was before the City Court on a charge of drunkenness; another was discharged for a similar offence on Saturday last, and celebrated the occasion by getting drunk again. He was duly arrested and was yesterday fined 10s., that being his eighth appearance at the same court for drunkenness. Another pensioner also figured in yesterday's list and was fined 5s. *The habits of both men were well known to the police, but no report was asked for, and as a result they secured pensions.*"

One pensioner raised the novel plea that he had got drunk with his own money and not the pension money.

The *Australasian Insurance and Banking Record* drew serious attention in the early months of the operation of the Act to the political aspect of the question. It said:—"It is to be expected that the Victorian Old Age Pensions Act has come to stay. Nearly every organisation in Victoria becomes more or less political in the sense of exercising the electoral vote. Now, if 15,000 persons receive pensions they are likely to vote against any candidate for Parliamentary honours who may wish to reduce or to abolish their allowance. Then, all relatives who are glad to get rid of a natural obligation will join forces with them, and candidates will have to scheme to secure the Old Age Pensioner vote, just as they labour for the railway vote, the Civil Service vote, the publican's vote, and so forth. The pensioners might, indeed, be

disfranchised, but such a step would be difficult to accomplish in an age when the franchise is a fetish. Victoria appears to be committed to an expense which, for want of definite knowledge, may be widely estimated at from £300,000 to £500,000. That expense will not be thrown in any great measure upon the classes most productive of old age pensioners, but upon the few."

Cases of fraud very soon came to light. In March a pensioner was discovered to have a fair amount in the bank, and he was fined £20. Another case that caused a considerable sensation, on account of the severity of the sentence, was that of a poor old man whose wife was proved to have had £246 in the bank at the time he applied for pension. He was sentenced to twelve months' imprisonment.

The details I have given all apply to the early months of 1901. By the end of that year more than 16,000 pensions had been granted, and the State was committed to a charge of £310,000 a year.

In his Budget speech of 27th August, 1901, Mr. Peacock, the Prime Minister, reviewed the experience of six months' working of the Act, and warned the friends of Old Age Pensions that there was danger of the scheme breaking down. A tremendous amount of good had been done, he said, but many people had palmed off relatives on the State, and it would be a bad day for Victoria to encourage such persons to shirk their proper burdens, as even leading colonists and public servants were doing. "We do not want," he continued, "to inculcate the idea that the father and mother have not some claim upon those whom they have brought into existence. I have been shocked beyond measure to find numbers of cases where persons, who have had money of their own and relatives to whom they could look for support, have dispensed with their means by improper methods in order to make claims."

The Victorian Pensions Act which he passed in December 1901, and which cost £283,000 in pensions in the year ending 30th June, 1902, differs not a little from those of New Zealand and New South Wales, and is notable for the number of its precautions and reservations and for the care with which it tries to confine its pensions to the enfeebled and utterly necessitous.

The new Act reduced the maximum amount of pension to 8s., and provides that every application must be heard in open court; notice must be given to the police and information obtained from

them; confidential reports might be demanded from banks, friendly societies, and similar institutions; notice was to be given to immediate relatives, and they might be summoned to appear in court and show cause why they should not be ordered to contribute to the support of the applicant; and a pension might be cancelled, reduced, or suspended on account of drunken or intemperate habits.

The pensioner must be proved to have made reasonable efforts to provide for himself; and if he appears to be physically capable of earning, or part earning, his living, although over the age of 65, the pension may be refused or reduced. This differs entirely from the law in New South Wales and New Zealand, where the pension is given as a right on attaining the age of 65 whether the pensioner is able to work or not, and where he is allowed to supplement his income, if he chooses, to the extent of 13s. a week in New South Wales and 10s. a week in New Zealand, so that in these colonies a pensioner may enjoy an income of 20s. a week. In Victoria a pensioner's total income, including that resulting from his own exertions, is not allowed in any circumstances to exceed 10s. a week. The legal maximum pension of 8s. a week is diminished by 6d. for every £10 of savings.

Finally, the Act provided that no person should receive a Pension Certificate until he had executed a Deed Poll undertaking on demand to transfer to the Treasurer of Victoria all his real property, and authorising the Treasurer to deduct from the proceeds the total sum paid to the pensioner. It is easy to understand that while in New South Wales the number of pensioners on the books at the close of the financial year in 1902 was 22,252, and in New Zealand 12,776, the number in Victoria was only 13,410; although the respective numbers of persons over 65 in these colonies were, at the census of 1901, in New South Wales, 46,573; New Zealand, 31,353; Victoria, 66,051.

Another short Act was passed transferring all pensions under the 1900 Act to the new Act of 1901, and reducing them to 8s. a week when over that figure.

The stringent regulations of the new Acts produced a very marked effect, and the number of pensions, which had fallen from 16,000 in 1901 to 13,000 in 1902, was further reduced by the beginning of 1903 to 12,000.

At that time a large proportion of the pensions came up for the annual revision, and the new State Treasurer declared that he had

come to the conclusion that out of 12,000 pensioners only about 8000 were genuine cases for relief. He published the result of his examination of cases in one day, giving thirty-six examples. Of these he summarily cancelled twenty-two, and directed summonses to be issued against sons and daughters to contribute to the maintenance of parents in nine cases; so that only five pensions out of the thirty-six were renewed without question.

III.—NEW SOUTH WALES.

Population at 31st March, 1901,	-	-	-	1,354,846
Number over 65,	-	-	-	46,573

In New South Wales, after an agitation in favour of Old Age Pensions had been carried on for some years with the support of the Labour party, a Select Committee was appointed by Parliament in June, 1896, to consider the question; and later in the year Lieutenant-Colonel John Cash Neild, M.P., who was one of the most influential advocates of Old Age Pensions, was appointed a sole commissioner to visit Great Britain and Europe, in order to enquire into the question of Old Age Pensions and Charitable Relief. He presented a very valuable Report in 1898, and in December, 1900, an Act was passed for the establishment of Old Age Pensions, to come into operation in the middle of the next year. The Act is a copy of the New Zealand Act, with one or two alterations in the direction of greater liberality. As in New Zealand, £52 a year is taken as the standard income to be aimed at, but the Act authorised pensions of as much 10s. a week to be given, so that old persons with incomes of £26 or over have their incomes made up to £52. Pensions may also be given to persons under the age of sixty-five, but over sixty, if they are physically unfit to earn a livelihood.

The population of New South Wales is nearly 1,400,000, and the estimate for the first year was that the Old Age Pensions would cost £350,000. The actual cost was about £500,000, and at the close of the first pension year there were 22,252 pensions current, representing an annual payment of £531,823. The cost for the second year was estimated at £580,000, and the State Treasurer in his Budget speech made the comment that this was "obviously more than the country can afford." An amending Act was promised for the next session, but I cannot find that

such an Act has yet been submitted to Parliament. In April, 1903, the State Treasurer again emphatically asserted the pressing need for retrenchment and the necessity for a decrease in the Old Age Pension expenditure. The *Australasian Insurance and Banking Record* of March, 1903, contained the following interesting criticism of the Act:—

“The experience of two years since the passing of the Act has amply justified those critics of the measure who based their opposition on the extent of the liability involved. The Act is obviously proving an increasing embarrassment to the Treasury. The number of pensioners has risen to 22,250, with every prospect of an increase this year, while the total cost approximates a sum of £600,000. The deepest sympathiser with the humane intention of the Act, even while acknowledging the great blessing it has been to thousands of aged people, begins to question the ability of the State to stand the increasing strain. When the measure was before Parliament the financial question was dismissed with the assurance that the additional customs revenue would more than meet the case. The saving in the grants to charitable institutions was also urged. But experience shows that a great new class of dependents on the State has been formed without appreciably lessening the demand for public and private outlay on other charities.

“While there was undue leniency at first, the Act is now carefully and well administered, and no substantial saving is possible under it as it now exists. There is no doubt that a great many persons are in receipt of pensions the cost of whose maintenance should be shared by well-to-do relatives, but the Act gives no power to bring relatives to their duty, and moral suasion often fails in its effect.”

I have already mentioned the Benevolent Homes of New Zealand, and the above extract makes reference to the charitable institutions of New South Wales. It may be desirable here to give a brief account of the system of poor relief in Australasia.

I summarise the following account from the volume for 1901-02 of the Statistical Account of the Seven Colonies of Australasia by the Government Statistician of New South Wales.

One of the most satisfactory features of the social condition of the Australian communities is the wide distribution of wealth, and the small proportion of people who are brought within the reach of want. The violent contrast between the rich and the

poor which blots the civilisation of the old world is not observable in these young states. It is, unfortunately, only too plain that a certain amount of poverty does exist; but there is a complete absence of a hereditary pauper class, and no one is born into the hopeless conditions which characterise the lives of so many millions in Europe. No poor rate is levied in Australasia, the assistance granted by the State to able-bodied men who find themselves out of employment in time of depression taking the form of payment in money or in rations for work done by them.

When the State grants aid for philanthropic purposes the management of the institutions supervising the expenditure is in private hands, and in addition to State-aided institutions there are numerous charities wholly maintained by private subscriptions, whose efforts for the relief of those whom penury, sickness, or misfortune has afflicted, are beyond praise.

In addition to the above, a liberal amount of out-door relief is given in all the Australasian provinces, and destitute children are taken care of, either by being supported in the Government institutions, or by being boarded out to persons deemed able to take care of them properly. The inmates of the institutions referred to are in almost all cases aged persons.

That may be taken as an official statement, but it does not throw much light upon the actual operations of the machinery described. For this, however, we can turn to the evidence of another witness.

Lieutenant-Colonel Neild, in the Report to the Government of New South Wales, which has already been mentioned, asserts:—

“That not only are the methods employed in New South Wales without legislative or regulatory control, but that they are painfully less humane than those of the much decried poor law system of England. Entering upon the duties of my commission with a happy assurance that New South Wales had made fair advancement in the pathway of enlightened treatment of the aged and destitute, and that the public asylums were conducted upon a reasonably satisfactory basis, I have become profoundly impressed with the fact that the public system and establishments of this country are antiquated, unsatisfactory, and unworthy a land professing enlightened principles and the Christian religion.”

He notes especially the following points in which New South Wales compares unfavourably with England:—

The English law provides for visitation of workhouses by

guardians, justices, visiting committees, Local Government inspectors, and medical inspectors. There is nothing corresponding to this in New South Wales. The management of the institutions is in the hands of private persons who are irresponsible and uncontrolled.

The regulations of the Local Government Board in England provide for classification of the inmates of workhouses according to seven specified classes, so that those who are suffering from disease of body or mind shall be separated from the healthy, and those of moral character and good habits shall not be compelled to associate with those who are otherwise. In New South Wales persons of good character and bad character, of good habits and evil habits, diseased and healthy, sane and insane, are herded together.

There is no provision in the colony for the purchase of books, newspapers, and games, or for the supply of tobacco and snuff, or for the provision of the necessaries for the making of afternoon tea by the aged female inmates, as is done in England.

In England it is illegal to separate married couples against their will, and in many workhouses comfortable private quarters are provided for them. Lieutenant-Colonel Neild describes in detail the arrangements made in several English workhouses, and then he exclaims, "the comparison between this and the enforced separation and squalid surroundings of the unfortunate inmates of the wretched barrack institutions we have in this colony is ghastly."

I think all this is very instructive. It is quite possible that, if the experiment of a poor law administered on enlightened and humane principles had been given a trial in the Australasian Colonies, the agitation for Old Age Pensions might never have gained sufficient popular support to float the Acts through the legislatures.

VI.—GERMANY.

Law of Infirmary and Old Age Insurance:—Passed, 22nd June, 1889;
Came into force, 1st January, 1891; Amended, 8th June, 1891;
Amended, 13th July, 1899.

An exhaustive analysis of the law of 1889 is given by Mr. T. E. Young, in Volume XXIX. of the "Journal of the Institute of

Actuaries." As important modifications were introduced in 1899, it may be interesting to give a brief account of the present state of the law, which I draw, for the greater part, from a Handbook issued in 1903 by Ernst Funke and Walter Hering, officials of the Imperial State Insurance Department at Berlin.

The law applies, broadly speaking, to all persons in regular employment receiving not more than £100 a year.

Wage earners are divided into five classes, according to wages received, and a special rate of weekly contributions is fixed for each class.

Class.	Income in Marks per annum.	Corresponding Weekly Wages in English Money.	Weekly Contributi'ns
I.	Up to M. 350 a year.	Up to 6/9 per week.	14 Pf.
II.	Over M. 350 to M. 550	Over 6/9 to 10/7	20 „
III.	„ M. 550 to M. 850	„ 10/7 to 16/4	24 „
IV.	„ M. 850 to M. 1,150	„ 16/4 to 22/-	30 „
V.	„ M. 1,150 to M. 2,000	„ 22/- to 38/6	36 „

Eight pf. are approximately equivalent to a penny, and the weekly contribution amounts therefore to 1½d. per week in Class I., and 4½d. per week in Class V. Every worker is provided with an Insurance card, and whenever wages are paid the employer is responsible for the attachment to the card of an Insurance stamp of the value of the requisite contribution. These stamps have to be procured by the employer from the Post-office, and he is entitled to deduct half the cost from the worker, so that the Insurance Tax is equally divided between the employers and the employed.

I have obtained for Westphalia, which is one of the most prosperous and progressive districts in Germany, the proportional numbers contributing in these five classes for the year 1901.

Class.	Number of weekly contributions.	Number of persons insured, reckoning that 46 weekly contributions are paid per head.	Percentage of insured in each class.
I.	1,879,510	42,874	7·11 per cent.
II.	8,612,768	184,140	32·58 „
III.	8,077,362	179,083	30·55 „
IV.	4,895,166	108,622	18·52 „
V.	2,972,314	60,001	11·24 „
Total,	26,437,120	574,720	100 „

Class III. may be taken to represent the position of the average German workman.

The law applies to working men and women engaged in industrial occupations, to sailors, to commercial clerks and officials, and also to persons in domestic service. Thus, an employer of labour has not only to pay tax for his workmen and his clerks (with the power of recovering a portion from them) but he is under the same responsibility in his household for his domestic servants, for the governess, the gardener, and even the washerwoman.

There is one curious exception, the reason for which is not at once apparent. Clerks and apprentices employed in pharmaceutical chemists' shops do not come within the operation of the law, because, I am informed, the expense of the course of study which has to be gone through before the necessary qualification can be obtained restricts the business to those who are already possessed of private resources.

is granted at age 70 provided contributions have been paid for at least 30 years of 40 working weeks in each (instead of 47 weeks, as fixed by the law of 1889), special arrangements being made for those who were over the age of 40 at 1st January, 1891, so that on giving proof that certain conditions had been fulfilled, they were entitled to qualify for Old Age Pensions by payment of contributions for a number of insurance years equal to the difference between their actual age at that date and 70.

The amount of Old Age Pension is now a fixed amount for each class, and does not depend upon the number of contributions paid as under the law of 1889.

Class I.—M. 110=	£5	10	0	per annum, or about	3½d. a day.
„ II.—M. 140=	7	0	0	„	4½d. „
„ III.—M. 170=	8	10	0	„	5½d. „
„ IV.—M. 200=	10	0	0	„	6½d. „
„ V.—M. 230=	11	10	0	„	7½d. „

of which the State in every case finds 50 marks, or £2 10s. per annum, the balance coming out of funds formed from the accumulation of the weekly contributions.

is granted to any workman who is permanently incapacitated, whatever his age, provided he has paid contributions for five insurance years. The test of incapacity is that he has been unable, by reason of sickness, to earn as much as one-third of the ordinary wages of a day labourer in the place where he resides for 26 weeks.

The amount of the pension depends on the period for which contributions have been paid, and is not a fixed amount, as in the case of the Old Age Pensions.

There is first of all a minimum basis of pension for each class, as follows:—

Class I.,	..	..	60 marks per annum.
„ II.,	..	..	70 „ „
„ III.,	..	..	80 „ „
„ IV.,	..	..	90 „ „
„ V.,	..	..	100 „ „

To this an addition is made according to the number of contributions that have been paid. For every weekly contribution the addition to the yearly amount of pension is:—

Class I.,	..	..	..	3 Pf.
„ II.,	..	..	..	6 „
„ III.,	..	..	..	8 „
„ IV.,	..	..	..	10 „
„ V.,	..	..	..	12 „

and finally the Government adds 50 marks per annum.

Thus, a workman who has contributed for 500 weeks in Class III., and is then permanently incapacitated, would obtain a pension of—

$$\begin{aligned} & \text{M. } 80 + 500 \times \cdot 08 \text{ M.} + \text{M. } 50 \\ & = \text{M. } (80 + 40 + 50) \\ & = \text{M. } 170, \text{ or } \text{£}8 \text{ } 10\text{s. per annum.} \\ & = \text{nearly } 6\text{d. a day.} \end{aligned}$$

A workman is "in benefit" so far as the Infirmity Pension is concerned after paying contributions for five years of 40 weeks, that is, for 200 weeks at least. If he has contributed for less than 500 weeks the minimum basis of the pension is subject to modification. The minimum basis is considered as representing 500 weeks; if the workman has contributed for 200 weeks and belongs, for example, to Class III., it is still calculated on the basis of 500 weeks, but he is only allowed a rateable proportion of the amount appertaining to his class according to the number of weekly contributions he has actually paid, the balance being made up rateably from the amount for Class I. In the case supposed the pension will be as follows:—

- (1.) On account of minimum basis

200	300	
—	—	
500	500	
× 80 M. + × 60 M.		
= 32 + 36 = 68 Marks		
 - (2.) Addition on account of the number of contributions actually paid:—

200 × 8 Pf.	= 1600 Pf.	= 16 Marks
-------------	------------	------------
 - (3.) Addition from the Imperial Government 50 Marks
- | | |
|----------------------|-----------|
| Total Pension, | 134 Marks |
| = £6 14s. per annum. | |

Periods of military service and of certified sickness are counted towards the pension without any contribution being required. For such periods the worker is considered to be in Class II.

The average allowances in 1900 were—for Infirmity, £7 6s.; for Old Age, £7 10s.; or, say, 5d. per day.

The amount of Infirmity Pension after 1200 weeks' contributions have been paid may be compared with the Old Age Pension to which the workman is then entitled.

	Infirmity Pension.	Old Age Pension.
Class I.	M. 146	M. 110
" II.	192	140
" III.	226	170
" IV.	260	200
" V.	294	230

It will be seen that there is a distinct inducement to qualify for Infirmary Pension rather than Old Age Pension, and all the more so because an Infirmary Pension can be claimed after only five years' contributions have been paid, while the qualifying period for an Old Age Pension is thirty years.

The administration is carried out by institutions which are formed by the Government, with (called by Mr. the help of the Federal Council. Germany is Young, "Insurance now divided, for this purpose, into thirty-one Institutes"). districts, each of which forms its own fund.

The administrative officers are nominated by the district authorities, and a committee of at least ten members is connected with the fund, on which the employers and the employed have equal representation.

For every fund a Government commissioner is appointed, who may attend all the meetings for the purpose of protecting the interests of the Empire and of other District Funds.

In connection with every District Fund there is at least one Board of Arbitration, consisting of a president, who is the State or town officer, a vice-president, and four members (two employers and two workmen), elected by the committee of the fund for five years. This Board may examine witnesses under oath.

The number of Arbitration Boards in existence at the end of 1898 was 525. The remarkable extent to which the decisions of the District Institutions relating to Pension Claims give rise to appeals is shown in the following statement based upon figures contained in the Annual Report on the work of the Imperial Insurance Department:—

Year.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
Number of Appeals to Boards of Arbitration, ...	19,441	13,550	15,831	18,819	20,643	20,009	20,716
Number of Appeals to Imperial Insurance Department from Awards of Boards of Arbitration, ...	3,571	3,194	2,923	3,606	4,246	3,964	4,015

The following statistics will give some idea of the growth and extent of the Pension Laws in Germany. The rapid growth of the Infirmary Pensions is noticeable :—

Expenditure on Pensions.

	Old Age.	Infirmary.	Total.
1891	£765,335	£3	£765,338
1892	1,053,580	67,672	1,121,252
1893	1,138,167	264,143	1,402,310
1894	1,223,722	508,659	1,732,381
1895	1,328,818	776,282	2,105,100
1896	1,370,647	1,055,059	2,425,706
1897	1,381,215	1,369,316	2,750,531
1898	..	..	*3,130,000
1899	..	..	*3,380,000
1900	1,311,210	2,678,650	3,989,860
1901	1,232,785	3,251,085	4,483,870

* Estimated.

New Pensions created in each Year.

	No. for Infirmary.	No. for Old Age.	Total.
1895	55,905	30,032	85,937
1896	60,562	25,402	85,964
1897	71,733	21,688	93,421
1898	80,836	18,826	99,662
1899	96,655	17,326	113,981
1900	125,821	19,867	145,688
1901	..	..	151,853

Besides compulsory insurance against infirmity and old age, there are also compulsory laws for insurance against temporary sickness (up to thirteen weeks of sickness) and against accident.

I. For Sickness Insurance the contribution is about 5d. in the £ on wages received, two-thirds of which is payable by the workman and one-third by the employer.

The benefits consist of free medical treatment and medicines, with a minimum allowance of half the previous wages during the first thirteen weeks of sickness.

II. For Accident Insurance the whole cost is paid by the employers, an assessment being made in proportion to the salaries and wages paid.

The liability for the first thirteen weeks of illness resulting from accident falls on the Sickness Fund, and the Accident Fund only comes in after that time. The minimum benefit is two-thirds of the previous wages, and there are also payments at death.

The total payments on account of Sickness Insurance, Accident Insurance, Old Age and Infirmary Insurance, amounted in 1901 to £19,100,000; and in 1902 to £21,700,000.

1902 Figures.		1902 Figures.	
For Sickness Insurance,	£10,300,000	Paid by State, - -	£2,100,000
For Accident Insurance,	5,400,000	From Workmen's Contributions, - - -	9,100,000
For Old Age and Infirmary, including Expenses of Administration, Expenditure on Sanatoria, etc., - -	6,000,000	From Employers' Contributions, - - -	10,500,000
	<u>£21,700,000</u>		<u>£21,700,000</u>

One of the chief reasons which made an amending Act necessary in 1899 was the serious state of the insurance funds in the agricultural districts.

In agricultural occupations the burden for pensions was five times as heavy as commercial occupations, the proportion of persons aged seventy and over being 27 per cent. in agriculture, and only 5 per cent. in commerce.

In parts of the empire where the population was mainly agricultural the finances of the District Funds were consequently in an unsatisfactory condition (*e.g.*, East Prussia and Lower Bavaria); and to meet this the new law provided that from 1st January, 1900, 40 per cent. of the contributions received by each Insurance Institution should go to a Common Imperial Fund, which in return should provide 75 per cent. of the cost of Old Age Pensions and a certain portion (the minimum basis) of Invalidity Pensions in all the 31 Districts.

In cases of *Invalidity* the District Funds are empowered to take in hand members who are not adequately provided for by the sickness insurance, and to place them under more favourable conditions, with the object of preventing permanent disability, and there has recently been a very interesting development in the operations of this pro-

vision of the law. The prospect of having a great and increasing number of chronic invalids on their hands has stimulated the District Funds to a great preventive movement. Consumption was found to be the worst enemy, and the enlarged powers which were conferred by the Act of 1899 in regard to the treatment of sick persons, encouraged the experiment first of sending consumptive patients to Sanatoria and then of building their own Sanatoria and cure establishments. There are now 70 or 80 Sanatoria provided, and they can treat 30,000 cases in a year. The expenditure on Sanatoria in 1901 was £365,000, and the charge is growing rapidly.

This experiment is claimed to have been highly successful, 74 per cent. of the patients treated having been restored to the full power of work. There has not, however, been time to test the permanency of the restoration to health, especially in the case of consumptives, and the cost is increasing at such a rate that it may become a very serious burden to the funds.

This sketch, brief as it is, may enable us to appreciate the force of a remark made by the *Berlin Tageblatt* some years ago:—"The German citizen, in consequence of this social legislation, will come under control so complete and all-embracing that little will be left for him to do."

V.—ENGLAND.

In England there has been much debate and controversy during the last 20 years on this subject, and the conclusion appears to be that Englishmen are not disposed to adopt any system of Old Age Pensions administered by Government.

Among other objections to the methods adopted in the colonies, I will only allude here to the important question of cost. The cost of Old Age Pensions in the United Kingdom on the New Zealand plan would be about £17,000,000 a year, and the annual charge in Newcastle, supposing that city to bear its share of the whole in proportion to population, would be £90,000. This would mean about 1s. 7d. in the £ on the rates. Those who pay rates in their rent would have to submit to an increase of rent, and a man who now pays 5s. a week for his house would have to pay 5s. 6d. at least. This difference of 6d. a week probably represents what

the average working man would have to contribute towards a system of Old Age Pensions similar to that which is established in New Zealand.

It may be urged that there would be a set off to this charge in a reduction of the Poor Rates; but that this would be a very small matter has been shown by Mr. Rowntree of York, in his remarkable book "*Poverty; a Study of Town Life.*" He there shows that in the city of York Old Age Pensions at 65 would not directly affect more than one in thirty of those who are living in poverty.

The German system is never likely to be adopted in this country. The English working man is jealous of his independence, and it is difficult to imagine that he would submit to any compulsory deduction from his wages.

For our own country the problem of provision for Old Age must, I think, be solved along different lines, and I have little doubt that the solution will be found in the characteristic English way by developing existing institutions. Progress has already been made in this direction. Looking back over the last twenty years, the principle of superannuation which was already established in the Government Civil Service and in the railway services of the country, has been adopted by the great municipal corporations, by local government bodies, and by nearly all important business organisations, and is rapidly extending; and in another direction those engaged in the business of Life Insurance are aware how general the practice has become among the professional and trading classes during the same period of arranging insurances so as to procure provision for old age.

The most interesting question at the present time is the attitude of the working classes, with whom the final decision must rest. In this connection I recall the fact that insurance against sickness, which in Germany is a matter of compulsion and of Government regulation, has been successfully provided in England by the voluntary enterprise of our working men. The great Friendly Societies, which have flourished so remarkably during the last fifty years, have been founded by working men, managed by working men, and brought through all their difficulties by the judgment and wisdom of working men. They furnish remarkable evidence of the capacity for administration and organisation which exists among the working classes of our country.

I think that there is every reason to anticipate that the working

men of England will settle the question of Old Age Pensions in the same way through their Friendly Societies and Trades Unions.

The Manchester Unity of Oddfellows has recently published an important investigation into the mortality and sickness experienced by that Society during the five years 1893-1897, and from these tables it appears that a young man joining a Friendly Society at the age of 18 can arrange to have the usual sickness benefit after the age of 65 replaced by a fixed pension of 5s. per week for an extra payment of from 2d. to 3d. per week, which, moreover, frees him from further payment of contributions after 65.

This makes it perfectly feasible for the younger members of Friendly Societies to insure for Old Age Pensions, and the principle has already been introduced in some districts of requiring all new members to do this.

The Trades Unions have also taken up the question, and there are at least 55 Trades Unions which already pay Old Age Pensions, some of them being very important bodies.

There is an interesting example in the North of England of what can be done by voluntary and organised effort. The North-umberland and Durham Miners' Permanent Relief Society began 28 years ago to pay Old Age Pensions; the Society now numbers 123,000 members, and provides pensions of 5s. per week for old and infirm members, for a weekly contribution of 2½d.

We have good reason to hope that these are indications of a movement which will grow and increase until working men in regular employment provide for old age, through their own voluntary societies, as generally and as successfully as at present they provide against times of sickness.

But when all is done we cannot expect the whole field to be immediately covered by voluntary effort. Even in Germany the Insurance laws, compulsory and wide-sweeping as they are, cannot include those who are not in regular employment. There will remain, at any rate for many years to come, a residuum which can only be provided for through the operation of the Poor Law.

This suggests another line of development which is required to supplement and complete the efforts of voluntary agencies. And here again much has already been done. I have already quoted Lieut.-Col. J. C. Neild's account of the administration of the English Poor Law, and I will only add here some words of the late Professor W. E. H. Lecky, M.P., taken from the Draft

Report submitted by him to the Special Committee of the House of Commons on the Aged Deserving Poor (1899):—

“It is, I believe, universally felt that, while Poor Law relief in some form should be open to all the destitute, the deserving aged poor should be discriminated from the thriftless, the drunken, and the immoral. Nor is it, I think, very difficult to establish the broad lines of what ought to be done. The fact that the better class of the aged poor had saved some small, though wholly insufficient, income, and were, therefore, not absolutely destitute, ought not to disqualify them for relief. They should, as far as possible, receive it in their own homes. Care should be taken that husband and wife were not separated. If their infirmities or their circumstances made it desirable for them to live in the workhouse, they should be separated from paupers of bad character, and should be entitled to some relaxation of discipline relating to hours, visitors, and privacy. As a matter of fact all this not only may be done but is done in numerous cases. The vast majority of the destitute poor of all kinds of the age of sixty-five and upwards are in receipt of out-door relief, and Mr. Knollys and Mr. Cleaver have furnished us with decisive evidence of the extent to which classification according to merit actually exists under our present Poor Law administration. The administration of the Board of Guardians of the West Derby Union (Liverpool), as described to us by Mr. Cleaver, seems to me to leave little or nothing to be desired. It is made to include the necessitous as well as the destitute; it is in all its parts most carefully and skilfully discriminated according to merit, and separate cottages have been erected for the benefit of deserving married couples.”

While the Poor Law must now and for many years to come fill an important place, I think that the hope of the future lies in the extension of voluntary effort and the strict limitation of official and legal methods for providing for the poor. All the facts go to show that the proportion of the population living in a state of destitution has diminished steadily during the last half century, and that the present position is most hopeful. May we not look forward to the time when destitution and pauperism have disappeared from a nation of self-reliant, self-respecting men and women, who have provided for themselves a national system of Old Age Pensions by a complete net-work of voluntary agencies?

CONSEQUENTIAL LOSS.

By HERBERT R. CLOUGH.

*A Paper read before the Insurance Institute of Nottingham,
March 25, 1904.*

WHEN, at the request of the President, I promised to read a paper before the members of this Institute I was for a considerable time at a loss for a suitable title ; I mean a title that would at once indicate to you the nature of the subject and which would at the same time be a correct definition of the particular form of Insurance proposed to be dealt with.

The term that would first suggest itself, and which has for some years been used to describe the somewhat crude attempts that have been made to transact this form of Insurance, is "Profits Insurance" or "Loss of Profits Insurance." But, as will be seen later, neither of these could properly be used as a heading for this paper.

Another title was the "Insurance of Fire Losses due to Interruption of Trade as distinct from Material Damage." This would explain the scope of the matter which follows, but I was spared from inflicting so lengthy a title upon you by the discovery of another, which is not only much shorter but may be quite as appropriately employed as a heading for this paper. The title selected and which bids fair to become generally used as the term for describing this form of Insurance is, as you have heard, "Consequential Loss."

The purpose of this paper is to put forward a claim for insurance against consequential loss due to or arising out of fire.

Insurance against material damage caused by a fire (which will be called ordinary Fire Insurance hereafter) is generally recognised as being a necessity. It has also been pretty generally

held that ordinary Fire Insurance fully compensated the Insured for the loss he sustained through the occurrence of a fire. In the re-instatement of buildings and contents, or adequate compensation therefor, ordinary Fire Insurance certainly does protect the Insured. But it will be my endeavour to indicate a serious loss that may follow fire for which ordinary Fire Insurance makes no provision whatever.

That such loss does exist, and that it has been recognised by manufacturers and others, is proved by the fact that they have in the past eagerly sought to protect themselves by Insurance.

Little need be said respecting the form of policy that, until recently, was the only Insurance designed to cover the loss over and above the damage for which ordinary Fire Insurance provides. This so-called

Insurance against Loss of Profits

with which we have been familiar is an undertaking on the part of the Insurer to pay a certain percentage of the amount recovered from the Fire Offices. For example:—

Suppose a firm hold a Fire policy for £50,000 it is possible for such firm to effect an additional insurance for say 20 per cent. of that sum to cover their loss of profits. That means: if, after a fire, the material damage is assessed by the Fire Office at £20,000 they would secure an additional 20 per cent. of that sum, viz., £4000, under their Loss of Profit policy.

Such Insurance is nothing more or less than a payment in excess of the Fire Office's estimate of the material damage, and it will be patent that, if such excess Insurance were really required and could be justified, the Fire Companies might just as well cover the additional risk and benefit by an increase in their premium incomes.

That the Fire Offices have looked upon this species of Insurance with much disfavour is well known, and, from the point of view of the Insured, it is equally unsatisfactory. A firm may have on their premises at the time a fire occurs a large or a small stock. The amount they would recover under the above described loss of profit policy would be large or small according to the Fire Company's settlement. And yet the loss following the fire might be practically the same in both cases. In short, the Insured stands to lose or gain according as his material damage

may be great or small. He may also gain in another way inasmuch as he is not required to give proof that his profits were equal to the percentage for which he insured.

If the policy above described does not adequately insure against the loss which follows fire, how is the consequential loss occasioned that a firm may suffer and which is not covered by ordinary Fire Insurance? I submit that it is caused by the

Interruption of Business

distinct altogether from the material loss. If this is so, the next question is, What is the consequential loss that is caused by the interruption or dislocation of a business after fire? The ready answer would at once be, "They lose their profits." That is so, but they lose a great deal more.

Before proceeding to the further and more important loss that follows fire it should be pointed out that this paper does not profess to discuss the loss of profits aspect of the question. Loss of net profit is certainly part of the consequential loss due to fire, and in the scheme which follows, net profits can be easily embodied. But reference to this would lead on to that very wide and controversial subject of "moral hazard," which might well be made the subject of a separate paper.

As before mentioned, there is a prominent feature of consequential loss more deserving of attention than net profit on account of its importance from an Insurance point of view and because it has been sadly overlooked in the past. As that part of the subject will more than suffice for the purpose of illustrating the objects of "Consequential Loss Insurance," the moral hazard theories respecting net profit cannot at present be entered upon; and no further allusion will be made here as to the desirability or otherwise of the inclusion of net profit in any scheme for the insurance of consequential loss.

But, although there may be those who consider it advisable that a firm should suffer to some extent by fire—say, by losing their profits—I doubt if there are any who think it desirable that a concern should, during a period of interruption, incur so serious a loss as to cripple their profits for many years to come and in some cases even extinguish the business altogether. But this has happened and is always liable to happen.

This loss is made because firms have to maintain, whether

their works are going or stopped, certain charges or working expenses which unfortunately cannot be discontinued because the business has been interfered with by fire. These current working expenses have been appropriately termed

Fixed Charges.

Now let us examine the nature of these fixed charges. We all know that it is quite a common thing for Fire Insurance Companies to insure a firm's rent for twelve months after fire: that is a fixed charge—it is an outlay that does not cease although the premises have been damaged by fire.

To specify the particular items of fixed charges that are applicable to different trades and manufactures would take up too much space. It will suffice to enumerate a few only that are common to most concerns. I will mention them at once and then deal with them *seriatim*. They are—

Rates and Taxes.

Salaries to Permanent Staff.

Interest on Borrowed Capital.

Interest on Mortgages.

Interest on Debentures.

Interest on Preference Shares.

Insurance Premiums.

Advertising.

If the rent continues after fire so do the rates and taxes, and it will not require much stretch of imagination to estimate what a very large sum has to be set aside by large manufacturing concerns and business houses to meet the demands of the overseers. These rates and taxes when business is in progress are defrayed out of the turnover of the firm, but as they do not cease when the business is checked by fire they become a fixed charge.

We all know in this (Nottingham) district that many manufacturers deem it prudent to bind their employees to their service for terms of years by agreements. We see at once that the payment of these salaries during periods of interruption after fire is an outlay for which the employer

gets no return; in short, they are a fixed charge on his business which has to be met, although his turnover for the time being is suspended. But does the absence of an agreement between an employer and employees make it less desirable, from a business standpoint, that the former should retain the services of the latter after a fire? The official, it may be, is probably of great value to his employer and the latter does not wish to lose his services. He purposes re-starting his business, when he will again require him. If, then, it is to the employer's interests to keep the principal members of his staff, I ask you to consider what an enormous sum (approximating many thousands of pounds) a large business concern would be called upon to disburse in the course of the six, nine, or twelve months that their works are stopped or their sales are suspended. Is it not at once clear that the employers, whether they be limited liability companies or private firms, are in such cases confronted with the alternative of going without their own profits for a long time after they resume operations or the dismissal of their officials?

And if, by prudently providing against this contingency, it can be made possible for the employer to save himself from such a predicament, and for the positions of the staff to be made secure, should not any sound scheme of Insurance that offers such protection be welcomed?

In this connection I should like to make what will probably be considered a rather absurd comparison, but as it goes to illustrate the point it may possibly be excused. Supposing our legislators were to pass a law making an employer liable to pay his staff after a fire, would not Insurance be promptly forthcoming to relieve the employer from his liability, as was the case with the Employers' Liability Act and the Workmen's Compensation Act?

Well, if it is a commercial necessity on the part of the employer to retain his staff during the time his business is interrupted, does it not amount to the same thing? Is it not as important that he should insure against this heavy loss which is the result of fire as that he should be protected against the loss he sustains by the damage or destruction of his stock or plant?

The foregoing remarks do not refer to workpeople whose services can readily be dispensed with and, it may be, transferred to other workshops or factories.

The next four items may be put under one heading.

Whether it be the borrowed capital of the Interest on private firm, or the debentures of the limited Mortgages, liability company, or the mortgages of either, the Debentures, interest has to be met before any net profit can Borrowed Capital be held to have been made, and *that* interest has and Preference to be paid whether the business is proceeding or Shares. not. Let us first take the private firm. We all know how extensively business concerns are worked on borrowed capital—businesses that are sound in every respect so long as they are able to trade. But if a disastrous fire puts a stop to their buying and selling, or it may be manufacturing, they find themselves in a position of having to pay the interest on their borrowed capital, whilst the source from which they had previously derived it has vanished, viz., “The gross profits or margin on their trading.” The result is that, the compensation from the Fire Offices entirely failing to provide the means whereby they have to pay the interest for the period during which their business has been suspended, this has to be met out of capital. In many cases this, with other similar outgo, means crippling the firm’s operations for many years to come, and in others the extinction of the business altogether.

Had this interest been provided for by Insurance along with the other fixed charges of the firm, they would have had the full amount in hand to replace their stock and plant.

In like manner with the limited liability company’s debenture interest. This is often a very large and serious item, and until it has been paid there can be no interest for the ordinary shareholders. It is distinctly in the interests of the latter that it should be provided for. But when a business is seriously interrupted by fire not only do the shareholders create a debit on their future dividends by payment of debenture interest, but there is even the risk of failure to meet this; in which case the debenture-holders are entitled to foreclose, with the possible result that when the business is wound up the shareholders have little or nothing returned to them of the capital they have invested. As with the loan interest of the private firm so with the limited liability company—had payment of the debenture interest been provided for none of the calamities mentioned would have been likely to occur.

It is only needful to add that these remarks apply equally to mortgage interest and preference interest, with this exception

as regards the latter, that interest on preference shares cannot be assumed to be a fixed charge unless dividends over and above have been regularly declared on the ordinary shares.

This item, although of much less magnitude than those previously instanced, is referred to **Insurance Premiums.** because it is common to all businesses. A firm pays twelve months' premiums in advance in the expectation that they will be defrayed by the trading profits of the year. But if a fire occurs the day after renewal and business is suspended the premium paid becomes "Dead Money," for the opportunity of the trading earning the premiums is lost. That Insurance premiums are considered by all firms to be a very heavy drag on their resources is well known to us. Indeed, we are constantly told that it is a much larger item than it ought to be; that it is a growing item, and that the tendency of the Offices to make it grow is nothing short of a national disgrace, and ought to be put a stop to. However, although perhaps not cheerfully remitted, Insurance premiums continue to be paid; for firms well know the value of the protection they secure. But, seriously, the sum expended annually by a large firm for Insurance is by no means trifling. Insurance premiums are essentially a fixed charge on a firm's business.

We cannot fail to recognise what an important **Advertising.** part advertising plays in modern commercial life, and reports from time to time have informed us of the huge sums that certain large firms expend annually in this direction; indeed, not only does the prosperity but sometimes even the very existence of many an enterprise depend upon advertisement on a large scale. It is well known that contracts for advertisements are made ahead, involving payment when the manufacture of the wares they proclaim has been brought to a standstill by fire. But, in any case, firms would deem it prudent to continue their advertisements during temporary stoppage. It will thus be seen that advertising is one of those items that has been described as a fixed charge.

All the various charges have now been dealt with. There are, of course, many other items applicable to particular trades. But, taking only these common fixed charges, it will be conceded that they total up to a very large sum per annum; the payment of which must, if fire interrupts a business for any length of time, involve the firm in an enormous loss. That loss if not insured

must, in the first place, be met out of capital or reserves, to reconstitute which it will inevitably have to be spread over future years' profits and affect the future capacity of net earning power.

It will now be necessary to explain that consequential loss may be felt acutely when the material damage may be slight, or, to put it more plainly, the consequential loss may be the real loss sustained as the result of fire. Of course, where the premises are completely destroyed by fire, the material damage loss and consequential loss would both be "total." But, taking the case of a factory where several processes are carried on, dependent upon one another, if a fire attacks the vital part of the factory, destroying the machinery whereby one or two processes are carried on but from which the other processes are fed, the liability of the Fire Office would be confined to the portions affected; that is, their loss would be "partial." But the consequential loss would not be so restricted, seeing the whole works would be stopped and the "total" loss would accrue until such time as the damaged portions were reinstated and the whole works restarted.

Although many examples could be given to illustrate how particular sections of works in varying trades are vital as affecting the whole of the firm's operations, the above example will serve to show that serious consequential loss may be experienced for which ordinary Fire Insurance makes no provision and when the material damage for which the ordinary Fire policy *does* provide is but slight.

Having attempted to prove that Insurance to provide for the fixed charges of firms during periods of interruption after fire is necessary, the question arises, Has any scheme been devised that adequately meets the case? The only scheme based on sound commercial and Insurance lines that, to the best knowledge of the writer, has been brought to fruition is the one devised by Mr. Gautier de Ste Croix. It assumes that the fixed charges of all firms are borne by, or paid out of, their margin on

Turnover.

It further assumes that if a business is affected by fire the loss will arise out of a reduction of turnover. If this is so, it naturally follows that whatever proportion of their annual turnover is lost by a firm, as the result of fire, the same proportion of the annual sum insured for fixed charges should be paid by the Insurer by way of compensation.

For example: A firm insures an annual sum of £10,000 to cover their various items of fixed charges. Their normal annual turnover before the fire was £100,000. For the twelve months afterwards it was reduced to £60,000. That is a loss in turnover of £40,000, or 4-10ths, of the normal annual turnover. The firm thus becomes entitled to 4-10ths of the annual sum insured for fixed charges, viz., £4000.

Although this is practically the effect of the scheme that Mr. Ste Croix has brought forward, a more convenient method of arriving at the amount due to the Insured is to strike the percentage that the sum insured for fixed charges bears to the normal annual turnover and for the Insurance Company to pay that percentage on the shortage in turnover. In the above instance it would be as £10,000 is to £100,000, viz., 10 per cent. Then the sum recoverable by the Insured would be 10 per cent. of £40,000 (loss of turnover), viz., £4000, as before.

But the advantage of adopting the latter method becomes clear when it is pointed out that the fixed charges (salaries, interest, &c.) have to be met by the Insured more frequently than once a year, and this scheme of Insurance would hardly meet the requirements of the average trader if twelve months had to elapse before the loss could be adjusted. So a system of

Monthly Payments

has been introduced.

No difficulty can be experienced in this; the same system is adhered to, for most firms can ascertain their loss of turnover month by month, and the percentage payable has been arrived at. In the above example it would simply mean that 10 per cent. would be payable on the monthly loss of turnover as shown at the end of each month.

It will also be observed that we are enabled by this method to arrive at the exact amount payable each month when the turnover is only partly disturbed.

These monthly payments would continue until either the business had regained its former status, which would be indicated by the turnover again assuming normal proportions, or until the period (number of months) for which the Insuring Office is liable to pay has been reached. This brings us to another phase of the scheme which has been framed to meet the varying requirements of different trades and businesses.

Fire would not affect one class of trade to the same extent as another. For instance, a wholesale provision merchant might only require three months in which to get his business going, whilst certain manufacturers would require twelve months. It will be manifest that if policies issued under this scheme provided twelve months' compensation in all cases, and an even basis of rating were adopted, the provision merchant who is only stopped for three months would be paying for the manufacturer whose business is suspended for twelve months; for the Insuring Company could not pay as much in three months after fire as in twelve months. Therefore the proposer is invited to select one of four periods for which the Insurance Company shall be liable to compensate him after fire, viz., 3, 6, 9, or 12 months, and the rate of premium charged will vary accordingly, increasing from three to twelve months, such rate (whatever period may be selected) being charged on the annual amount of fixed charges insured.

It may be as well to add here that all policies would be renewable annually, and that as the probability of a fire occurring would be the same as to the Fire Offices the rates charged should be based on the rates paid for ordinary Fire Insurance.

We find, then, that under this scheme for insuring fixed charges the compensation payable would be ascertained by the shortage of turnover after fire. And this may lead some to be sceptical as to the working out of such a scheme. It may be asked, Would there not be complications arise as to the difference of turnover before and after fire, and would not trading concerns resent the intrusion of the Insurance official into their book-keeping arrangements? No such inspection on the part of the Company is necessary; for all limited liability companies, and most private firms, to-day have their books regularly audited by duly qualified accountants, and the services of these gentlemen would be requisitioned in the event of a claim; they would act in a somewhat similar capacity to the Insuring Company as the loss assessor acts on behalf of the Fire Office.

They would certify the percentage the fixed charges bore to the turnover, and they would certify the loss of turnover month by month. But they would do more. They would be called upon to certify that the fixed charges insured were not in excess of the "normal" fixed charges before the fire, and they would have to certify that the fixed charges payable after the fire had been disbursed. For instance, if a firm insured their permanent salaries

for £10,000 per annum, and it was found that their normal salaries were only £5000 per year, or that after fire they were only paying at the rate of £5000, the Insuring Company of course would only be called upon to pay at the rate of £5000 per annum ; just as a Fire Office would only pay the correct amount of material damage, although the sum insured may be in excess.

It will thus be seen that a firm could not obtain more than they had lost, and, if that is so, can such insurance be held to be increasing the "moral hazard?"

It has been argued that even the compensation a firm has obtained from the Fire Office has placed them in a better position than they were in before a fire, and that therefore no additional insurance of any kind that aims at compensation for loss due to fire can be necessary ; but is not this a misconception ? We have seen that serious consequential loss may exist where there has been very little material damage sustained. Why, then, should a firm be debarred from insuring against their fixed charges in such case because sums in excess of the actual loss have at times been paid by the Fire Offices for material damage ?

I have stated that this scheme for insuring fixed charges has the virtue of never compensating a firm for more than its actual loss. If the material damage were likewise adjusted the firm cannot possibly have received more than it lost. As a matter of fact, they have further losses ; they lose their net profit, and they probably lose part of their business connection, which will perhaps take many years to regain.

The mention of a firm losing its connection after a fire leads to yet another important feature of this scheme, viz.,

Increased Cost of Working after Fire.

It frequently happens that firms after fire instead of waiting for the re-insatement of their premises will, in order to retain their customers, take temporary premises, buy from competitors, or by other means do their utmost to maintain their turnover. In doing so they incur almost invariably very considerable expenditure in excess of their normal outgo. If the loss were in such cases proved on the loss of turnover sustained it would be a palpable injustice to the Insured. Any consequential loss insurance therefore which sought to fully protect the Insured would have to provide for this by agreeing to pay the sums for which they were liable for fixed

charges by way of "increased cost of working." Thus, if the sum for which a firm has insured their fixed charges works out at, say £1000 per month, the Insurance Company should consent to pay up to £1000 per month for (1) fixed charges, (2) increased cost of working, (3) or both.

Many instances of firms losing large sums by the extra cost of continuing business after fire could be given; but one will suffice as an illustration.

I quote from the *Yorkshire Post*, 19th December 1902, which gives an account of the annual meeting of "Bentley's Yorkshire Breweries, Ltd." The chairman, in addressing the shareholders, said:—

"The fire which occurred in June last, . . . by which the brewing part of the premises were totally destroyed, stopped all progress when the directors thought that . . . they would be able . . . to close the year with a better result than that attained the previous year. The fire prevented all hope of that, and the loss of net profit was entirely attributable to the result of having to buy beer instead of making it themselves. . . . But for the loss of profits sustained in having to buy beer he estimated that the balance-sheet would have shown an increased net profit of £10,000."

Is not that a clear case of consequential loss? If the fixed charges of that brewery had been insured and the compensation had been applied—as they would have been—to defray the extra cost of buying beer, the balance-sheet would have shown a very different complexion.

I have now dealt with the main outlines of this subject. I have endeavoured to show that there is (1) a serious consequential loss after fire distinct from material damage, (2) that consequential loss may be heavy when material damage is slight.

I have explained that by Mr. Ste Croix's scheme of "monthly payments" for fixed charges and increased cost of working, a firm may be adequately compensated without increasing the "moral hazard."

It only remains to add that in the application of such a scheme there are many details which it is impossible to even touch upon here. But whatever variation of policy-wording may be found necessary in different industries the main principle would remain, viz., "compensation for fixed charges to be according to, and in proportion to, the loss of trade sustained as the result of fire."

NOTES ON INVESTMENTS.

By JOHN ROBB.

*A Paper read before the Insurance Institute of South Africa,
December 1903.*

THE subject for our consideration this evening—Investments—covers so wide a field that it is quite impossible to deal exhaustively with it in the time at our disposal.

It has been necessary, therefore, to select a few points likely to prove of such general interest as to lead to a full discussion, from which additional information may be gathered.

It may be as well first to point out, as has often been done before, that investments are made primarily for interest-earning and not for profit-making purposes. Profits certainly are made from time to time by the realisation of certain classes of security; but, for a Life Office, the first object is absolute safety, so far as that is attainable, and the second a reliable rather than a high interest rate. One of the difficulties in attaining this object here is the paucity of long-term investments, the custom of the colony being that practically all loans are fixed for a period of 12 months only, and are then terminable at three months' notice. This necessarily leads to a somewhat fluctuating condition of things. Of late years a number of municipal bodies have, in consequence of the rapid development of the country, been obliged to borrow largely to meet growing needs; and as these loans are in most cases fixed for long periods they are desirable ones for Life Assurance Offices to have, and will, as they increase, tend to have a steadying effect upon the average rate.

Investments suitable for Life Assurance Offices obtainable in this colony are not of so varied a nature as those dealt with by British Offices, being confined principally to the following :—

Mortgages on Landed Property.

House Property.

Loans on Cape Government Stock.

Loans on Municipal Stock.

Loans on Life Policies.

Other suitable investments to be obtained are so few in number that, for our present purpose, they may be passed over. Reference to the balance-sheets of almost any of the best known Home Offices will show that these items do not as a rule much exceed 50 per cent. of the total funds, and in many cases are very considerably below that proportion.

Such items as British, Indian, and Foreign Government Securities, Reversion and Life Interests, Railway Stocks and Debentures, Railway Preference, and other shares figure very largely on most of the lists. Some of them, owing to the very low rate of interest obtainable on them, would not be looked on with favour in this country; but others yield a return which would be welcome even to investors who look for higher rates than usually fall to the lot of even Colonial Insurance Companies. Turning now to our Cape investments, it appears to me that if we first shortly consider a few points in connection with "Loans on Mortgage," and then pass on to the subject of "Loans on Life Policies," we shall probably be meeting the wishes of most of those present, as upon this subject all—British, Foreign, and Colonial alike—are equally interested. Others items figuring on the list of local Insurance investments do not present any features unfamiliar to those whose experience has been gained in other countries. One exception, in connection with "Loans to Public Bodies," may be referred to in passing.

In consequence of the failure of a County Council to meet the interest on its loans, a special Act was passed to meet all similar cases. This law authorised the Supreme Court (on application by the creditor) to assess a special rate, not exceeding 1d. in the £, upon the value of all immovable property in the town or district in default, the rate to be devoted solely to the liquidation of such debt. In other respects the financial affairs of local bodies are governed in some few cases by private Acts, but in the majority of cases by what is known as the "Scanlen Act," into the provisions of which it is not necessary for us to go at present.

In a colony covering so wide an area, great
Loans on portions of which are not in close touch with
Mortgage. either railway or main-road communication, it is
frequently very difficult to obtain reliable information as to values. Under ordinary circumstances it might be expected that the Divisional County valuations would form a fair basis upon which to negotiate loans, but in most districts experience has proved that this is but a broken reed to lean upon. In many cases the valuator apparently sits down in his office, takes the previous list, together with one giving the extent of each farm, and simply compiles a new list, valuing all farms at a certain fixed rate per morgen, apparently quite indifferent to the fact that farms on, say the eastern boundary of his district, may be—and indeed in several cases are—of double, or even treble, the value of those on the western boundary; apparently oblivious also of the fact that one may be a barren Karroo farm, while the adjoining one, six to eight miles distant, may have an ample water supply. Those who are even slightly acquainted with the Karroo will be able to appreciate what this difference means.

Improvements also, such as buildings, dams, windmills, fencing, etc., seem to count for little or nothing with a very large proportion of the public valuers. In consequence of this practice it is difficult at times to ascertain the true value of properties, but it may be taken that in quite 90 per cent. of the districts the farms are under- rather than over-valued, so that the investor cannot be said to be led into bad investments directly through the valuations. The few over-valued districts soon become known to investors, and allowance is made; but in practically all cases it is as well to insist upon having independent valuations. Fortunately in most districts there are well-known independent private appraisers whose certificates may be relied upon, but of course only by experience can it be found who the reliable men are.

In districts in which the Council valuator does actually go round to the farms anomalies are almost as frequent as in the others, and in consequence one occasionally has interviews with would-be borrowers, both interesting and instructive. Take a typical case. You are being interviewed by an applicant for a loan, and in the course of noting down heads of information you inquire "What is the Divisional Council valuation?" "I wouldn't take £3000 for the farm," is the reply. You repeat the question, informing the

applicant at the same time that you require it for purposes of record. "Oh, it is only £1800, but that is nothing"—you see the valuator is my uncle, or nephew, or cousin, or some other relative, as the case may be. If *he* is not a relative, his *wife* is, or there is some other reason put forward to account for his having so greatly under-valued the property. In some cases it is hinted by the applicant that hospitality, or even a small present, had its due effect in lowering the value of the property, in the valuator's eyes. The apparent simpleness with which these methods are laid bare is somewhat characteristic of our country cousins, and, as you will have anticipated, such simpleness is not to be too implicitly relied upon. Very full and authentic information as to what the farm is producing is, of course, a good guide as to its market value, although it by no means follows that it is producing all, or anything like all, of which it is capable. The amount of annual quitrent payable is another point which should on no account be overlooked, as in some of the districts these are so high as to create what is practically a first mortgage of several hundreds of pounds on many of the farms. I have not referred specially to town investments, not that the unreliable valuator is confined to the country districts, but because the sources of information are more accessible, and in consequence valuations may be more readily tested. Having been satisfied as to the value of the security offered, the next step is the registration of the mortgage. The actual system of registration is simplicity itself and requires little explanation.

In a proclamation issued as far back as 1714 provision was made for the due registration of mortgage bonds in the Public Debt Registry of the Cape. A further proclamation, issued in 1793, provided that all mortgage deeds not so registered would lose their right of preference over the ordinary creditor, but it was not until 1805 that registration was made compulsory.

From the date of this last proclamation (23rd May 1805) it became necessary to register all mortgages at the Deeds Office, otherwise they would not be recognised by the Courts as valid; and unregistered bonds previously in existence were ordered to be registered within a given time to save them from sharing a like fate.

The title deeds, or transfer, of the property to be mortgaged having been passed on to the solicitor, he is, in ordinary cases, in a position to readily ascertain at the Deeds Office whether there are

any onerous conditions or servitudes registered against such property, and further search at the Master's Office will put him in possession of any record which may exist against the borrower in the way of tacit hypothecations under testamentary disposition or otherwise. Assuming that the record is clear in both cases, the bond can then be drawn, lodged and registered within the space of from four to six days; that is, assuming that the solicitor attends promptly to the matter. (Perhaps it is needless to tell any of you who have had experience of solicitors that the time stated is usually exceeded.) The bond having been duly registered, and an endorsement to that effect placed on the borrower's title deed, the matter is complete so far as the deeds are concerned.

It is usual to include in mortgage bonds passed in this colony what is known as the "General Clause," which reads as follows:—

"And, moreover, hereby binding generally his person and all his property, both such as he is already or may in future become possessed of, movable and immovable, without any exception, and submitting them all, and the choice thereof, to constraint and execution as the law directs."

From this it will be seen that after having mortgaged certain specific property, which the mortgagee has agreed to accept as security for the loan, the borrower also binds generally all he is possessed of, or may subsequently become possessed of. The practice of inserting this clause is so generally followed, and so well known, that it would be thought that holders of second bonds would be careful to safeguard themselves, but that this is not always done, the records of the Supreme Court abundantly testify. This applies more especially to cases where a second mortgage includes a bond on specified movables. In all such cases it is necessary for the mortgagee to take formal delivery of the articles bonded in order that he may secure his preference—over the General Clause in the previous bond—on those particular articles. The commercial community have for many years past striven to have the law amended so as to make it illegal to have this clause included in ordinary mortgages, but it is difficult to see why the Legislature should intervene in what is, after all, a business contract, into which neither party is compelled to enter against his will.

Interest on loans should not be made payable at longer intervals than six months, as in cases of insolvency it only ranks as

preferrent for a period of "one year and the current year," any interest due at the time of insolvency over and above that period ranking concurrently with the unsecured claims.

In considering the question of advances on policies, we are practically considering the local law regarding cessions, as apart from that each Company will naturally follow its ordinary practice.

It will be as well, therefore, if we first read Section 16 of the Life Assurance Act No. 13 of 1891, which is as follows:—

"The property and interest of every person under any policy of assurance upon his own life, and which shall have endured for not less than three years from the date of the payment of the first premium thereon, or in any moneys payable thereunder, shall not be seized or taken in execution under any process of court, or in the event of the sequestration of the estate of such person as insolvent shall not vest in the trustee, or otherwise, for the benefit of the creditors of his estate, subject, however, to the conditions or limitations following."

Shortly after the passing of this Act the question was raised whether, as under this section policies were protected against creditors, they could lawfully be ceded as security. One Office at least was advised that they could not. How, in the face of a subsequent section (27), this could be held was not very clear, but in consequence several other Companies at once obtained legal opinion on the subject, and, as far as I have heard, such opinions were unanimously against the first mentioned. It is quite certain that the intention of Section 16 was simply to protect the policy against the general creditor, but such protection could not possibly be made to apply against a specific cession, nor, as I have already said, do subsequent portions of the Act support such a view.

Taking it, then, as accepted that a valid cession in security can be given, the next point for the lender to be clear upon is that there are no previous cessions in existence.

By Section 27 of the Act protection is given to the Company in regard to the settlement of claims should payment be made to the wrong person *bona fide*, the rightful owner having neglected to register his claim; and the words used, "any *advance* or payment," I think clearly show that they are intended to cover loans made by the Company concerned as well.

You are of course aware that a perfectly valid cession of a policy may be made by separate deed, without possession of the policy

being given. I understand that even a verbal cession would hold good, provided the cessionary was in a position to satisfactorily prove his lien.

Registration of cessions not being compulsory, some danger may arise, as even possession of the policy does not do away with the risk of a previous cession being in existence. Of course, a claimant who did not have actual possession of the policy would always require to have a very clear case in order to obtain relief.

There is only one exception to this rule, as far as I know, and that is in case of a cession by ante-nuptial contract. The ante-nuptial contract is an institution of very much older date than I had been aware of before looking into the matter in connection with these notes.

The law on the subject refers to a placaat of Charles V., dated as far back as the 4th October, 1540. Section VI. of this placaat was amended in this colony as recently as 1875. The same proclamation as provided for the compulsory registration of mortgages (23rd May 1805) also made the registration of ante-nuptial contracts compulsory, but it did not provide that the actual contract should be filed at the Deeds Office; what was registered being practically confined to a record of the fact that such a record had been entered into between "A" and "B." It was not until the passing of Act 21 of 1875 that it was ordered that "duplicate originals" of every ante-nuptial contract entered into should be deposited at the Deeds Office. In this Act Life policies are specially referred to, and it is provided that premiums paid by the husband upon a policy ceded to the wife shall not (in case of insolvency) come under the head of payments wrongly made, as provided for in the Insolvent Ordinance of 1843.

An ante-nuptial contract must in all cases be a notarial document, and, as already pointed out, registered at the Deeds Office, where, upon payment of a small fee, it is open for inspection; and it would appear that, to some extent, this is considered to be equivalent to a public notification of the existence of such contract to all concerned. How this would affect a Company making advances upon its own policies is not very clear; but as against a third party it has been laid down more than once that a cession by ante-nuptial contract (which had not been notified to the Company) holds good against one of later date, even with the possession of the policy, and in face of the fact that the later

cession had been duly registered in the books of the Company, and that the supposed holder under it had paid the premiums for several years.

Probably most of us are acquainted with cases where the assured, *after* having made over his policy by ante-nuptial contract, has ceded it to a third party as security for money advanced. It does not necessarily follow that this is done with fraudulent intent, nor does it follow that such cessions are of no value whatever, as in a large proportion of cases the husband reserves to himself a reversionary interest in the policy in case his wife should predecease him, and this interest it is quite competent for him to cede.

In actual practice, however, it may be taken that in such cases the lender is under the impression that he is receiving a clear cession of the policy, and he receives a rather rude awakening should the death of the assured happen before that of the wife. As far as I am aware, no actual case of loss has occurred to any Company in consequence of its having made an advance on a policy previously ceded under a marriage settlement; and the question arises whether a Company making advances on its own policies is in a different position to an outsider. The only reference to the subject I have been able to find is contained in the judgment in the case of *Morkel v. Holm*—a case in which the assured, “Morkel,” after making over the policy to his intended wife by ante-nuptial contract, had subsequently ceded it to “Holm.” In the course of the judgment (which went against Holm), the Chief Justice incidentally remarked that the Society would have been justified in paying out the proceeds of the policy to “Holm” at “Morkel’s” death had Mrs. Morkel’s claim not been notified. This would appear to justify the assumption that a Company is not bound to go behind the documents in its possession, or of which it has received notice; and if payment may legitimately be made of the whole amount of the assurance, it does not seem unreasonable to infer that an advance may safely be made upon receiving a cession of the policy. To all intents and purposes such an advance is really a payment on account of the Company’s future liability, and should be allowed for, as a matter of course, when the policy becomes a claim.

The 27th Section of the Life Assurance Act reads as follows:—

“No assignment of a policy shall confer on the assignee therein named, his executors, administrators, or assigns, any

right to sue the Company for the amount of such policy, or the moneys assured or secured thereby, until a written notice of the date and purport of such assignment shall have been given to the Company at its principal place of business, and the date on which such notice shall be received shall regulate the priority of all claims under any assignment, and any advance or payment *bona fide* made upon or in respect of any policy by the Company before the date upon which such notice shall have been received shall be valid and effectual against the assignee giving such notice."

You will notice that the words used are "*any advance*" or "*payment bona-fide made*"; but this does not finally settle the question as to whether the registration of the ante-nuptial contract at the Deeds Office is or is not a sufficient notice to the Company, or whether this section is sufficient to over-ride previous Acts on the subject. Other questions are continually being raised in connection with cessions by ante-nuptial contract. There is the point as to whether a trustee under such a contract is justified in becoming a party to a cession at all; but as long as all the parties concerned *do* agree to such cession, a Company is sufficiently safeguarded in granting a loan.

Frequently, however, provision is made by which, in the case of a wife dying first, the proceeds of the policy pass to any children born of the marriage. In such cases a loan should on no account be granted except under authority of an Order of Court, unless the loan is being taken up solely for the purpose of keeping the policy in force, in which case Sub-section 2 of Section 23 of the Assurance Act provides the necessary authority.

Frequently difficulties arise owing to the loose wording used in drawing up contracts; very misleading terms being made use of at times, and, more frequently still, indefinite language, the first reading of which is in opposition to other portions of the document.

It is not at all an uncommon thing to find after the name of a trustee the words "his executors, administrators, or assigns," which, from the very nature of the trust, could not possibly have been intended.

In granting loans on policies it is advisable in all cases to take an *absolute cession*, merely giving the borrower a right of redemption. In this way possible difficulties, in case of the borrower becoming insolvent, may be avoided, the policy for the time-being being the actual property of the Company, subject only to the redemption condition.

A rather interesting Fire Insurance case, which bears to some extent upon this point, was decided in the Supreme Court in 1884, the finding in which is contrary to, or rather would appear to do away with the necessity of, the advice which I have ventured to give regarding the obtaining of absolute cessions.

The case was that of *Wetzlar v. The General Insurance Co.* "Wheels" insured his stock for £1000 with the "General." The policy was ceded to "Wetzlar" as collateral security for a debt of £200, and the property was subsequently destroyed by fire. Various questions were raised in the case, but upon the point we are considering the following is all that is reported :—

"Defendant's counsel contended further that as 'Wetzlar' was only cessionary for £200 he was not entitled to claim more.

"Plaintiff's counsel contended that there was a question between 'Wheels' and 'Wetzlar' only. 'Wheels' was not the owner of the policy—'Wetzlar' as cessionary held it against the world.

"The Court found that the value of the stock destroyed was £750, and gave judgment for that amount for the plaintiff with costs."

The practice followed by, apparently, all Life Offices is so diametrically opposed to this that one can only suppose that this law does not apply to Life insurances.

Usually no great difficulty is found when a claim arises in inducing the parties to arrange a settlement between themselves, but should the question ever be disputed it would be well worth while contesting the point with a view to obtaining an authoritative decision upon the subject.

There are so many other points of more or less interest arising out of this evening's topic, some of which are sure to be touched upon in our subsequent discussion, that I do not propose to take up further time now, but trust that on some future occasion the subject of "Investments" may be further and more fully dealt with by some other member of our Institute.

I venture to put this suggestion forward, as in these days of keen competition for new business our energies are so taken up in that one direction that the study of matters of an equal or even greater importance is apt to be relegated to a subordinate position.

WEIGHTS AND MEASURES.

By C. E. GALWEY, A.I.A.

*A Paper read before the Insurance Institute of New Zealand
August 11, 1904.*

THE subject of the paper which I have the honour of reading before you to-night is one of considerable public importance at the present time. The task of dealing with it is a difficult one, and should have been placed in better hands; but as the need of remodelled tables of weights and measures was alluded to by most of the speakers in the debate which followed an interesting paper, read last May, on Counting and Counting Machines, I hope, at least, to induce further discussion of the matter by bringing it before the Institute.

As the subject of counting is closely connected with that selected for this evening, and as some people, from force of habit, seem to think that it is only possible to reckon by tens, it may be as well to begin by saying it is possible, as has often been done in the past, to reckon by pairs, fives, dozens, or scores. Any number, in fact, could be used as the foundation of a system of reckoning, and of a vocabulary for numbers.

It is even possible, but perhaps not advisable, to base a vocabulary for numbers on one number, and a notation on another.

Practical methods of enumeration preceded the period of civilisation and the full development of language, and primitive races acquired the habit of counting on their fingers or toes. They were thus led, in most instances, to make ten the base of their language for numbers. Ancient Maori affords an example of a very primitive numerical language of this kind, based on ten, but with no means of representation by writing or figures.

The next step was to count by rows of pebbles, or on a simple form of abacus, and such methods were probably the origin of a very important discovery by the Hindus and others, namely, the *device of position*. Dr. Peacock gives a very rare example of the use of this expedient, in spoken words for numbers. According to him, some of the numerical words of Tibet, those from twenty-one to twenty-nine, for instance, are arranged so that the name for two acquires a value from position. Translated literally they would read as follows:—

two-one	two-four	two-seven
two-two	two-five	two-eight
two-three	two-six	two-nine

where two-one means what we call twenty-one.

It is not possible to say at what time numbers
Notation. were first represented by written characters. Every civilised nation had some kind of notation from very early times, but the invention of the nine figures and zero, with the best use of the device of place (or local value as it is sometimes called) must be credited to Hindustan. The Hindus are said to have been in possession of the idea twelve hundred years ago, and to them we owe our arithmetical notation, in which the value of a digit is fixed by its position. From what has been already said it will be evident that the number ten was made the radix of this and other notations, because people had previously, before they had learned to write, used ten as a base in thinking and speaking of numbers.

Turning now to the subject proper, the discussion
Weights and Measures. of weights and measures, the first point to bear in mind is that, even if it were possible to start afresh with a free hand, it would be no easy matter to arrange a perfect scheme. On the one hand the convenience of the general public would have to be consulted, not only with respect to the selection and dimensions of the fundamental units or standards, but also as to the manner in which all other units should be derived from those standards; on the other hand, it would be a scientific requirement that all standards of surface, bulk, weight, coinage, etc., and all other units depending on them, should be connected in the simplest and most direct manner possible, with a scientific fundamental unit of length. The

fulfilment of this last condition would facilitate calculation, and though such a connection does, to some extent, exist in our own and most other systems, the most obvious and complete manner of establishing it would be to bring the whole scheme, as far as possible, into agreement with the ordinary numerical notation, and to base it on the same radix—to have, that is, a decimal system.

There is only one magnitude, that of time, with respect to which nature suggests any definite units of measurement. The day and the year are indicated with great precision by the uniform apparent motion of the heavenly bodies. But it is only within comparatively modern times that it has been possible to determine a standard of length with mathematical exactness. This problem remained unsolved until Picard, in the 17th century, discovered that a pendulum which ticks seconds at a given latitude is always of exactly the same length. Ideas of linear measurement can now be founded on the dimensions of our planet itself. The pendulum could still be resorted to for purposes of verification, but the improved construction and multiplication of exact copies of the linear standard make verification by the pendulum unnecessary.

It was impossible for ancient nations, with their limited scientific knowledge, to fix on an object which would always be precisely of the same length, or to connect their unit of length with the element of time. They had, therefore, to fall back upon arbitrary standards. As these standards came into use chiefly by chance, it followed that the measures of one class, adopted even by the inhabitants of the same country, had no definite proportion to each other, and sometimes no intelligible connection with those of other classes. Almost every nation had its own different methods of measuring. To these causes are to be attributed the anomalies of our own tables and the difficulty of comparing them with those of other countries.

It will be instructive to consider for a moment
Present System. the historical origin of some of our weights and measures. We find that primitive races are somewhat vague in their ideas of distance and time. The ancient Maoris often estimated distance travelled by the number of nights spent on the journey, and I think that this is a good instance of a vague attempt at measurement by a primitive people. As civilisation progressed among the peoples of the old

world, definite though arbitrary standards would be agreed on, and, with remarkable unanimity, small magnitudes were referred to the grains of the different cereals, which have formed the staple food of the majority of mankind. The underlying idea was probably, originally, that barleycorns and rice grains were small enough to serve as indivisible units. It would not be thought necessary to divide such a unit into fractions, for microscopes and micrometers were not thought of then. Our smallest weight is still called a grain. It was enacted in England, in the reign of Henry III., that the pennyweight, or weight of a silver penny, should contain a specified number of grains of wheat well dried, that the ounce should be twenty pennyweights, the pound twelve ounces, and that eight pounds of wheat should fill a gallon. Another old English statute declares that the inch shall be the length of three grains of barley.

These are specimens of old enactments, now repealed. The inch is no longer divided into barleycorns or lines, but is now our smallest legal measure of length, so that we are at liberty to subdivide it as we please. The principal standards of length were generally connected with the human figure. The height of a tall man, the length of his forearm (ulna, ell, or cubit), his foot, his hand, his step when walking, the first joint of his thumb (inch), &c., have all served as units. Most of these measures are still familiar to us. The British yard is often roughly improvised by stretching out one arm, and taking the distance from the finger tips to the lips. The two arms stretched out will give the fathom. It is a strong argument in favour of retaining the yard or the fathom that either can be obtained approximately in such a simple manner.

Our word mile, again, is derived from the *millia passuum* (thousand paces) of the Romans, though the two distances differ considerably in length.

There was, in fact, no precision about any of these measures at first. There would be obviously considerable uncertainty about the exact dimensions of units, originally derived from the length of a King's arm, or the weight of a certain number of grains of wheat. It thus became necessary to define them more precisely, and to decree the relations between the derived multiples and sub-multiples. Metal standards were made for reference, and kept in the principal towns. These were generally badly constructed, and often lost or destroyed by fire. Several different

yards have been in use, but in course of time the pendulum furnished the means of correcting any further deviation from this standard. Later on, an improved connection was established between measures of length, weight, and capacity, and many inconvenient and cumbrous measures were abolished. There has been legislation on the subject in nearly every reign, and the result is still far from being satisfactory. The Imperial standards are the yard, pound avoirdupois, and gallon, but there are still many methods of weighing and measuring sanctioned by law or custom.

If we look at almost any one of our tables, say that of avoirdupois weight for instance, we see that it is not easy to detect any evidence of design in the ratios which the different weights bear to one another, except the fact that many of these ratios are numbers which can be divided again and again by 2.

Moreover the connections between the different tables are often clumsy. A few examples are given below :—

1 perch	=	30 $\frac{1}{4}$ square yards.
1 dram avoirdupois	=	27 $\frac{1}{2}$ grains troy.
1 ounce "	=	437 $\frac{1}{2}$ " "
1 gallon contains		227·274 cubic inches.
1 cubic foot of water weighs		997·14 ounces avoirdupois.

We must remember that on the other hand we have the useful relations :—

10 square chains	=	1 acre.
1 pound avoirdupois	=	7,000 grains troy.
1 gallon of pure water weighs		10 pounds avoirdupois.

The historical origin of some of our measures has been briefly referred to. A more detailed examination would tend to prove that many of the denominations were originally isolated units, bearing no special relation to others now included in the same series. It has been asserted, it is not easy to see on what grounds, that some of these series conform to the duodecimal scale. Beyond a tendency to exhibit a graduation which admits of successive bisections (a graduation which may be illustrated by those of the ordinary carpenter's rule, or mariner's compass), no evidence of logical arrangement appears in any of our tables, with the exception of those which deal with time and angular measurement.

The civilised world has at all times been pretty well in agreement as to the methods of reckoning time. Nations have never differed materially in the selection of the principal units, because these units are periods of time, fixed by the movements of the earth and moon. These movements could not, of course, be thoroughly understood and accurately determined until scientific knowledge had made some progress, but they were sufficiently definite for practical purposes. The day, the most obvious division fixed by the revolution of the earth on its axis, is too short a period to be used as the only unit. At a very early period, therefore, time was measured by lunar months, and the moon's path in the heavens was closely studied by nomadic races of people who spent their lives in the open air. Five days, or sometimes seven days, constituted the week.

The skill and thoughtful investigation of the Chaldean and Persian astronomers led to the change from lunar to solar astronomy, and the year became the chief measure of time. It is noteworthy that these ancient astronomers gave us our angular measurement. They observed that it took the sun about 365 days to complete its motion in the ecliptic, they therefore divided the circle into 360 degrees, 360 being a convenient number for subdivision. There are twelve full moons in the year, hence the division into months. Neither these divisions, nor the number of weeks in the month, days in the week, or the subdivision of the day, are likely to be altered by us.

They are not, however, decimal divisions, and this brings us at once to the question, Why did not ancient nations always base their weights and measures on the decimal scale? * One reason was that they had not decimal notation in the full sense that we understand it. The Hindus were familiar with vulgar fractions long ago, but it never occurred to them or to anyone else until the 16th century to extend their decimal notation by applying the principle of local value or position to fractional quantities. This was first done by Stevinus, though the expedient of separating the fraction from the whole number by the simple point did not come into use for some time afterwards. While civilised people, therefore, have generally based their *language* for numbers on ten, in ancient times the notation was either too clumsy for arithmetical operations of any kind, like that of the

* The ancient Egyptians and Chinese did so.

Romans, or founded on another number (sixty) by the Greeks, or imperfect, as has just been explained, in the case of the Hindus and Arabs, in so far that the device of position was not employed for fractions.

Ancient nations could not, therefore, be fully conscious of the advantages of the decimal scale for purposes of calculation, and no doubt they realised that ten is not a suitable number for subdivision. Putting the question of proposed alterations in our standards on one side for the present, it may at once be said that one of the chief arguments advanced by those who oppose a compulsory decimal system of weights and measures depends on the fact that the number ten has only two divisors different from itself and unity, namely, two and five.

It is, I suppose, generally conceded that twelve should have formed the base, not only of our verbal expression of numbers, but also of the plan by which we represent them by figures or signs. We should require two more digits, representing ten and eleven. Twelve would be designated by 10, twelve times twelve by 100, and so on. These numbers are capable of being resolved into more factors than are the powers of ten, viz. :—

twelve	= $2 \times 2 \times 3$
twelve \times twelve	= $2 \times 2 \times 2 \times 2 \times 3 \times 3$
ten	= 2×5
one hundred	= $2 \times 2 \times 5 \times 5$

and this property would be of some advantage. Arithmetical operations could be performed as easily in a duodecimal notation as in our own. A suggestion has been made that this is the first reform we should introduce. I do not think such an idea has ever been seriously entertained. We should require an entirely new nomenclature for numbers. One effect would be that the dates of all historical and official records would be thrown into confusion. No nation has ever based, or is likely to base, its numerical words on the number twelve.

With reference to binary subdivisions, it is true that, though we naturally count articles by tens, our instinct also leads us to divide a single article into halves, quarters, and eighths. Such subdivisions, however, can be used with a decimal system to an extent amply sufficient for all practical purposes. Perhaps the easiest way to make this clear is to take the dollar as an illustration. Half and quarter-dollar pieces are in circulation in the

United States. One-eighth dollar pieces* could be issued if necessary, and the value of these coins can easily be expressed in decimals of a dollar.

If the impracticability of changing the base of our language and notation for numbers be admitted, one of the arguments against decimalisation is disposed of. But other objections are brought forward. In a recent article on the subject in an Australian review, the writer remarks: "It has to be recognised that as a notation the decimal system of expressing fractions is a monstrous absurdity"; and he proceeds to state a short series of fractions in the ordinary manner and in decimals. It would of course be absurd to use .142857, etc., instead of $\frac{1}{7}$ in ordinary multiplication or division. No one has advocated the abolition of vulgar fractions, but if it is convenient to put $\frac{1}{7}$ in the form of an infinite series there is no absurdity in doing so, because the series diminishes so rapidly that the first few figures only are required.

In practice the rest of the fraction can be estimated. As a matter of fact, fractions must be treated in this way in order to reduce them to the fixed graduations of the various instruments used in weighing and measuring. It is much easier to reduce them to a decimal scale than to any other graduation, that of avoirdupois weight for instance, and they are no more likely to be precisely represented on one graduation than on the other. Suppose, for example, that the marking of the beam of a chemist's balance showed an ounce sub-divided in a certain scale (not necessarily a decimal one), it might easily happen that a mark could not be found to indicate, say, one-seventh of an ounce precisely, so that, to weigh this amount, the rider would have to be placed somewhere between two consecutive marks. Given a fine enough graduation, in any scale, this fractional distance could be estimated with great accuracy, and if the balance was sensitive, one-seventh of an ounce could be weighed correctly. Computation would be greatly facilitated, however, if the graduation of the beam was a decimal one. The same principles apply to all our measures, and the use of recurring decimals is not so absurd as might appear.

But if none of the theoretical objections to decimalisation are valid, there is a practical side to the question which must not be overlooked. Most people have little to do in the ordinary affairs of life with arithmetical computations, other than those which

* Bit, 12½ cents.

relate to money transactions. It is not proposed to discuss the currency to-night, and so far as weights and measures are concerned, it would probably be found that the great majority of the population was not only content with present methods, but might even resent a change. As the amount of inconvenience caused would depend on the nature and extent of the change decided on, it will be well, before dealing with this phase of the question, to consider those proposals in the direction of decimalisation which have received the most substantial support.

The best known of these schemes is the metric system, which was adopted in Paris in 1793, and extended to the French provinces in 1800. It had been designed to supersede all methods previously in use. The French Academy of Sciences had, some time before, appointed Commissioners to determine an invariable unit of length, on which the new system might be founded. Their choice lay between the length of a seconds pendulum, at a given latitude, and a unit of length deduced from the dimensions of our planet. They objected to the introduction of the element of time into the subject, and recommended the ten-millionth part of the terrestrial meridian, passing through Dunkirk and Formentera, as the linear unit. This was accepted and named the metre.

The metric system is characterised by simplicity, the chief essential of an ideal scheme. Every denomination specifies a quantity which is simply connected with the unit of length, the connecting ratio being either ten or a power of ten. The *mètre*, the unit of length, was intended to be the ten-millionth part of the distance from the equator to the pole, and to be dependent on geometrical magnitude only. To express the various decimal multipliers, Greek prefixes are employed, while Latin prefixes indicate decimal subdivisions.

The *arc*, the unit of surface, is a square decamètre.

The *litre*, the unit of capacity, is a cubic decimètre.

The *stère*, the unit of bulk, is a cubic mètre.

The *gramme*, the unit of weight, is a cubic centimètre of distilled water at its greatest density.

A franc piece weighs five grammes.

The metrical tables are given in the attached Appendix I. They have been taken from an English Order-in-Council, dated 19th May, 1898. The authoritative standards of the metric

system are now preserved in the Metric Bureau in Paris, "to which seventeen nations contribute in support and direction, and in which the most refined methods of comparison are adopted."

Angular measurement was also altered when the metric system was initiated.

The circle was divided into 400 grades.

1 grade " " 100 minutes.

1 minute " " 100 seconds.

This method of division has not met with general approval. An attempt to decimalise the divisions of time has been universally condemned and was abandoned.

The hostility displayed to the metric system in England has been, no doubt, partly due to national feeling, and to mere dislike of innovations contemporaneous with the French Revolution. This has not always been the case, however, as some of the objectors have been scientific men of the first rank. Sir John Herschel objected to the mètre. He considered that the distance from the equator to the pole is not the same on different meridians of longitude, and that the mètre is in any case short of its theoretical length by $1\frac{1}{8}$ inch. It is not necessary here to discuss the philosophical and theoretical faults of the mètre, to enquire if the unit of rectilinear magnitude should be based on a curve, or if the element of time has really been excluded or not in arriving at it. Moreover, astronomical measurements deal with magnitudes so vast, that the connection between them and any with which we are concerned on this earth is not a matter of much practical importance. The scientific mind aims of course at perfection, but Sir John Herschel's objections to the metric system were not entirely based on theoretical grounds. He wished to retain existing denominations where convenient, and to superadd to them by permissive legislation a decimal system for convenience of calculation.

Forty years ago it would have been quite possible
 Proposed to establish, and there were strong commercial
 British reasons for establishing, a rival British decimal
 Decimal system, which might have been adopted throughout
 System. the British Empire, and possibly in the United
 States, Germany, and other countries. No definite
 scheme has, however, at any time, been agreed on, and the
 international position has now altered considerably. Meanwhile

the metric system has made steady progress abroad, and it has been legalised even in England as a concurrent system. Moreover, we have to admit that though criticism has discovered some flaws it is by far the most perfect scheme that has yet been devised. Apparently it is now too late to establish a rival British scheme, and the long discussion which has taken place in the past is now narrowed down to the issue: Is the metric system to be made compulsory or not in British countries? What would the attitude of the general public be? It is not easy to say—it would probably vary according to circumstances. People are generally averse to change which does not bring them a direct and immediate benefit. The opposition in the United Kingdom might be considerable.

It is to be noted that a long struggle preceded

Progress of the final adoption of the metric system in France.
Metric System. The people objected to the Latin and Greek words, and in 1801 they were allowed to use, for a time, the old names applied to the new standards. A further concession was made to popular resistance in 1812. Decimal subdivisions were declared compulsory only in administrative transactions and written agreements. The "Usual" system was established, the standards of which were connected with the metric ones, but subdivided duodecimally or by binary divisions as of old. The ancient standards were still illegal, and the weights and measures of the "Usual" had the value according to the metric system marked on each. This led to so much imposition, of the kind known as "ringing the changes," that a decree was issued, in 1816, forbidding the use of decimals in shops, markets, and other retail business. It was not until 1837 that a law was passed making the metric system the sole legal system in France, from 1st January, 1840. It has been remarked that "the French nation was a long time learning decimals, and that the confusion of these changes offers a warning to other nations of what ought to be avoided."

The experience of other Continental countries seems to have been different. In a few years the people have become reconciled to the new units, with which no doubt they were already to some extent familiar through intercourse with France.

The following table shows approximate dates of introduction and compulsory enactment, and therefore gives a rough idea of the progress of the metric system. Old weights and measures are

still often used and quoted, however, in many of the countries in which it is nominally the only legal system.

	Introduced.	Date compulsory enactment became effective.	Remarks.
France	1793	1840	
Belgium	1801	*	Came gradually into use. Dutch names at first. Popular names.
Holland	1816	1821	
Greece	1836	*	
Switzerland ..	1850	1873	
Portugal	1852	1863	
Italy	1859	*	Introduced into some States previously.
Spain	1859	1868	
Brazil	1862	1872	
Argentina	1863	1887	
North German Confederation	1870	—	
German Empire	—	1872	
Austro-Hungary	1873	1876	
Norway	1875	1882	
Sweden	1875	1889	
Mauritius	—	1876	Much hostility shown at first.
Egypt	—	1876	
			Compulsory in all administrative transactions.
Finland	—	1886	
Denmark	—	*	Compulsory date not stated.

The metric system has also been adopted in the following countries:—Bulgaria, Congo Free State, Cuba and Porto Rico, the Danish, Dutch, French, German and Portugese Colonies and Dependencies, Hayti and Santo Domingo, Ionian Islands, Mexico, Roumania, Servia, the South and Central American Republics, &c., &c. No country of any importance has discarded the metric system after giving it a trial.

The above metrical countries have a population of about 445-millions.

It has, of course, been necessary to recognise the metrical tables, more or less, in non-metrical countries, viz. :—

England, recognised in contracts and legal proceedings 1864, made a concurrent legal system in 1897.

United States, made a concurrent legal system 1866.

Canada, legal by consent of parties 1879.

India, yard litre and kilogramme appointed standards 1871, Act never enforced.

Turkey, legalised 1882, compulsory for measures of capacity 1889, for weights 1892.

Japan, legalised.

Russia, made compulsory for the preparation and dispensing of drugs 1895.

Phillipines, legalised.

Tripoli, legalised.

&c., &c.

The population of the United States is 76 millions.

The population of the British Empire is 450 millions.

The population of the globe is estimated at 1800 millions.

Thus one quarter of the population of the world uses the metrical tables, more than one quarter the British system, and the remainder other methods.

The metric system has made little progress among **Compulsory** English-speaking races, but a considerable amount **Enactment.** of discussion is going on as to the advisability or otherwise of making it the sole legal system in the United Kingdom. Its superiority to our own as an instrument of calculation and measurement is admitted by most writers, and it is agreed that the work of education would be much shortened by its adoption. A more important aspect of the subject, however, is the effect which compulsory enactment would have on the commercial relations of England.

Better estimates of the commercial importance of other countries to the United Kingdom can be formed from tables of the values of imports and exports than from figures based on population statistics. It would at first sight appear that imports and exports could be easily classified under the headings metrical and non-metrical countries respectively. The initial difficulty is to define a metrical country. There is no doubt that in many cases the metric system is only in partial use. It has been legalised in Japan, for instance, just as it has been legalised in England; but the great majority of people in Japan still adhere to the old

measures. Japan, however, is claimed as a metrical country by one writer, who classifies as metrical or non-metrical practically the whole of British trade. Another writer, who classifies Japan as a non-metrical country, thinks that only the trade returns of the chief commercial countries of the world should be dealt with. He therefore excludes all figures relating to the trade with barbarous and semi-civilised races from his list. It will not be necessary to trouble you with these statistics. It will be sufficient for our purpose to know that from 54 to 59 per cent. of the imports into the United Kingdom come from non-metrical countries, and that these countries take, say roughly, 50 per cent. of the British exports.

The question whether compulsory enactment is expedient or not is ably discussed, from an English standpoint, on the basis of a careful analysis of British trade, in an article in the *Quarterly Review* of January last. The writer considers that, as regards selling in metrical countries, the British merchant has little to gain from the adoption of the metric units, except in markets where British goods are hard pressed. "In some trades (*e.g.*, cotton yarns) metrical countries have actually been compelled to depart from their own system, and to adopt the English system of counts." Foreign customers are often quite content with the English units, and, as has already been pointed out, the metric system is far from universal in some of the countries classed as metrical. In any case, catalogues and price lists are easily translated, and conversion tables are always available. On the other hand, the British manufacturer is undoubtedly handicapped in selling or tendering in metrical countries, especially when he supplies machinery.

Figures are given in the article which I am quoting to prove that the bulk of British trade is with countries and colonies not using the metric system, and the writer dwells on the important consideration that—"There seems no escape from the dilemma, that in so far as a change of system would strengthen our manufacturers in foreign markets, it would strengthen our foreign competitors in our own." In support of this contention it is pointed out that the United States use our Imperial measures, and that this fact has helped American manufacturers to invade colonial markets.

The position is fairly stated, and the conclusion arrived at is

distinctly unfavourable to the abolition of the Imperial measures at present.

It does not indeed seem at all probable that the legislature of either Great Britain or the United States will force engineering and other manufacturers to scrap a great part of their machinery, and adapt their tools and patterns to the metric units. It is urged in answer to this objection, by decimal associations, that machinery is constantly getting out of date and being discarded, so that the change could be made in most cases without much cost. It is also maintained that the metric standards would only be inconvenient during the transition period. They are quite as good as our own when considered as units of magnitude.

The difficulties and dangers of a change, however, Transition cannot be lightly passed over when one considers Period. the vast manufacturing industries of the United Kingdom. Temporary disturbance might be faced, but any permanent injury done to trade would be a more serious matter.

To smooth over difficulties, the metric system is included in the syllabus of the British primary schools, so that the public will soon become familiar with it. Perhaps the issue of a decimal coinage would be the best way to teach the people decimals.

With respect to the difficulties of transition, it may also be said that though the respective units of the two systems are in no case connected exactly by a simple ratio, yet there are many easily-remembered approximate relations, a few of which are given below :—

$1\frac{1}{6}$ yard	=	1 mètre very nearly.
$1\frac{1}{6}$ pound avoirdupois	=	$\frac{1}{2}$ kilogramme „
$1\frac{1}{6}$ gallon	=	5 litres „
1 inch	=	25 millimètres „
1 ton	=	1000 kilogrammes roughly.
1 cwt.	=	50 „ „
1 mile	=	$1\frac{1}{2}$ kilomètres „
1 hectare	=	$2\frac{1}{2}$ acres „
&c.		&c.

An addition, therefore, of ten per cent. to the yard, pound, and gallon, gives the mètre, $\frac{1}{2}$ kilogramme, and $\frac{1}{2}$ dekalitre respectively; or the equivalents may be stated as follows :—

The new metric inch would be 25 millimètres=·984 present inch.									
"	"	"	foot	"	"	$\frac{1}{4}$ metre	=·820	"	foot.
"	"	"	ounce	"	"	25 grammes	=·882	"	ounce.
"	"	"	yard	"	"	1 mètre	=1·094	"	yard.
"	"	"	pound	"	"	$\frac{1}{2}$ kilogramme	=1·102	"	pound.
"	"	"	gallon	"	"	5 litres	=1·100	"	gallon.
&c.					&c.				

The position in England may be shortly summed up as follows:—

The metric system is the only one which has a chance of being made international, and its adoption would greatly simplify the calculations of scientists and statisticians, also the estimates and accounts of all engineering, building, and kindred professions and trades, and those of many merchants and manufacturers. The great majority of the population would suffer considerable temporary inconvenience, and would not gain much by adopting the metric units in their retail and domestic affairs. If, however, it can be proved to the people of the United Kingdom that the commercial and manufacturing interests of the country would benefit by the change, the nation would, no doubt, be willing to accept it. Until this is proved, I do not think there is much chance of the metric system being made compulsory in Great Britain.

It still remains to discuss the matter as it affects
 Colonial ourselves and other British colonies; this has at
 Opinion. the same time an important bearing on the whole
 question, as the following statement will show:—

Trade of the United Kingdom with India and the colonies,
 1902:—

Value of imports = 20·2 per cent. of value of total imports
 into U.K.

Value of exports = 33·6 per cent. of value of total exports
 from U.K.

It will be well, therefore, to consider the question from the colonial point of view.

At the Conference of Colonial Premiers, held in London in 1902, the following resolution was agreed to:—"That it is advisable to adopt the metric system of weights and measures for use within the Empire, and the Prime Ministers urge the Governments represented at this Conference to give consideration

to the question of its early adoption." In September, 1902, a copy of this resolution was transmitted to the Governors of all British colonies by the Secretary of State for the Colonies, accompanied by a circular pointing out that "the resolution applies only to weights and measures and does not extend to currency." In the case of Crown colonies the opinions of the Chambers of Commerce and of local merchants were invited, while the Governors of Constitutional colonies were asked to ascertain what action their Ministers proposed to take in the matter. The official summary of the replies to this circular are given in the attached Appendix II. It will be seen that colonial opinion on the subject was correctly represented at the London Conference. Most of the replies are strongly in favour of decimalisation, but emphasise the necessity of a uniform system of weights, measures, and currency throughout the Empire. In a few instances the local authorities fear that a change would be regarded with dislike and suspicion by illiterate native races.

The parliaments of some of the principal Constitutional colonies were last year given an opportunity of expressing their views on the matter. In Cape Colony both Houses passed resolutions in favour of the metric system, and a decimal currency throughout the Empire. The Cape Government considers, however, that it would not be wise to introduce the change suddenly and without ample precautions.

The Commonwealth Parliament, in June, 1903, passed resolutions recommending, (1) The adoption of the metric system for use within the Empire, (2) The passage of a law by the Imperial Parliament making the metric system compulsory in the United Kingdom and (subject to the concurrence of local legislatures) in other parts of the Empire. The above resolutions were all forwarded to the Secretary of State for the Colonies.

Desire for a philosophical system, and the feeling that so great a change should be made as soon as possible in young countries, probably influenced Australian Members more than trade considerations. Taking the most liberal definition of a metrical country, that is including all French, German, Dutch, and Portugese possessions in the Pacific and elsewhere, only a small proportion of the Australian trade is metrical, as the following table will show:—

		1902.	
		Per cent. of value of total imports from Metrical countries.	Per cent. of value of total exports to Metrical countries.
		£	£
New South Wales	..	7·4	18·8
Victoria	..	11·7	9·8
South Australia	..	10·3	10·9
Queensland	..	6·8	2·6
Western Australia	..	8·9	2·8
Tasmania	..	2·0	5·7
Commonwealth	..	8·8	10·9
New Zealand	..	4·1	0·4

An act was passed in New Zealand last year consolidating and amending the law relating to weights and measures. In this statute the Colonial Secretary is directed to procure verified copies of the decimal standards deposited with the Imperial Board of Trade. Clause 25 empowers the Governor to proclaim the metric system the sole legal system in New Zealand from and after a date named in the Proclamation, such date to be not sooner than 1st January, 1906. The adoption of the system in New Zealand is thus left to the discretion of the Governor and his advisers.

A bill to enforce the metric system in the United Kingdom, introduced by Lord Belhaven, was read a second time in the House of Lords during the present session. It is not thought likely that it will become law.

In conclusion, I hope that I have succeeded in establishing the desirability of extending the decimal system to weights and measures, and thus at length giving full and fitting development to the great invention of the ancient Hindus.

We have seen that there are indeed practical difficulties to be contended with, and that, possibly, the time is not yet ripe for the full reform advocated. Yet no one can possibly doubt that reform is needed, that the metric system is the best, and, indeed, the only practical alternative to our own, and that we shall do well to consider it in all its bearings, and to adopt it as soon as ever the change becomes practicable.

I have to express my thanks to Mr. R. Coupland Harding for literature on the subject, also to Mr. Morris Fox and Mr. P. Muter for similar assistance.

APPENDIX I.

EQUIVALENTS OF METRIC WEIGHTS AND MEASURES FOR USE IN TRADE.

From English Order-in-Council dated 19th May, 1898.

I. METRIC TO IMPERIAL.

LINEAR MEASURES.

1 Millimètre (m.m)	$\frac{1}{1000}$ m.	=	0.03937 inches
1 Centimètre	$\frac{1}{100}$ m.	=	0.3937 "
1 Decimètre	$\frac{1}{10}$ m.	=	3.937 "
1 Mètre (m.)	..	=	39.370113 in.=1.0936143 yds.
1 Decamètre	10m. ..	=	10.936 yards
1 Hectomètre	100m. ..	=	109.36 "
1 Kilomètre	1000m. ..	=	0.62137 mile.

SQUARE MEASURES.

1 Sq. Centimètre	=	0.15500 sq. inches
1 Sq. Decimètre (100 sq. centimètres) ..	=	15.500 "
1 Sq. Mètre (100 sq. decimètres) ..	=	10.7639 sq. ft.=1.1960 sq. yds.
1 Are (100 sq. mètres) ..	=	119.60 sq. yards
1 Hectare (100 ares) ..	=	2.4711 acres

CUBIC MEASURES.

1 Cubic Centimètre ..	=	0.0610 cubic inches
1 Cubic Decimètre (c.d.) ..	=	61.024 "
1 Cubic Mètre (1000 cubic decimètres) ..	=	35.3148 c. ft.=1.307954 c. yds.

MEASURES OF CAPACITY.

1 Centilitre ($\frac{1}{100}$ litre) ..	=	0.070 gill
1 Decilitre ($\frac{1}{10}$ litre) ..	=	0.176 pint
1 Litre	=	1.75980 pints
1 Dekalitre (10 litres) ..	=	2.200 gallons
1 Hectolitre (100 litres) ..	=	22.00 " = 2.75 bushels

WEIGHTS.

1 Milligramme ($\frac{1}{1000}$ gramme)	=	0.015	grains	Avoirdupois
1 Centigramme ($\frac{1}{100}$ gramme)	=	0.154	"	"
1 Decigramme ($\frac{1}{10}$ gramme)	=	1.543	"	"
1 Gramme	=	15.432	"	"
1 Dekagramme (10 grammes)	=	5.644	drams	"
1 Hectogramme (100 grammes)	=	3.527	ounces	"
1 Kilogramme (1000 grammes)	=	2.2046223	pounds	"
1 Myriagramme (10 Kilogrammes)	=	22.046	"	"
1 Quintal (100 kilogrammes)	=	1.968	cwt.	"
1 Tonne (1000 kilogrammes)	=	0.9842	ton	"
1 Gramme	=	{	0.02215	ounces Troy
			15.432	grains "

II. IMPERIAL TO METRIC.**LINEAR MEASURES.**

1 Inch	=	25.400	millimètres
1 Foot	=	0.30480	mètres
1 Yard	=	0.914399	"
1 Pole ($5\frac{1}{2}$ yards)	=	5.0292	"
1 Chain	=	20.1168	"
1 Furlong (220 yards)	=	201.168	"
1 Mile	=	1.6093	kilomètres

SQUARE MEASURES.

1 Square Inch	=	6.4516	square centimètres
1 Square Foot	=	9.2903	" decimètres
1 Square Yard	=	0.836126	" mètres
1 Perch ($30\frac{1}{4}$ square yards)	=	25.293	" "
1 Rood (40 perches)	=	10.117	ares
1 Acre (4 roods)	=	0.40468	hectares
1 Square Mile (640 acres)	=	259.00	"

CUBIC MEASURES.

1 Cubic Inch	=	16.387	cubic centimètres
1 Cubic Foot (1728 cub. in.)	=	0.028317	" mètres
1 Cubic Yard (27 cub. feet)	=	0.764553	" "

MEASURES OF CAPACITY.

1 Gill	=	1.42	decilitres
1 Pint (4 gills)	=	0.568	litres
1 Quart (2 pints)	=	1.136	"
1 Gallon (4 quarts)	=	4.5459631	litres

1 Peck (2 gallons) ..	=	9.092 litres
1 Bushel (8 gallons) ..	=	3.637 dekalitres
1 Quarter (8 bushels) ..	=	2.909 hectolitres

Approximately 1 litre equals 1000 cubic centimètres, and
1 millilitre equals 1.00016 cubic centimètres.

APOTHECARIES' MEASURES.

1 Minim	=	0.059 millilitres
1 Fluid Scruple ..	=	1.184 "
1 Fluid Drachm (60 minims)	=	3.552 "
1 Fluid Ounce (8 drachms)	=	2.84123 "
1 Pint	=	0.568 litre
1 Gallon (8 pints) ..	=	4.5459631 litres

AVOIRDUPOIS WEIGHTS.

1 Grain	=	0.0648 grammes
1 Dram	=	1.772 "
1 Ounce (16 drams) ..	=	28.350 "
1 Pound (16 ounces) ..	=	0.45359243 kilogrammes
1 Stone (14 pounds) ..	=	6.350 "
1 Quarter (28 pounds) ..	=	12.70 "
1 Hundredweight (112 lbs.)	=	50.80 kilogrammes or 0.5080 quintals
1 Ton (20 cwt.)	=	1016.00 " or 1.0160 tonnes

TROY WEIGHTS.

1 Grain	=	0.0648 grammes
1 Pennyweight (24 grains)	=	1.5552 "
1 Ounce (20 pennyweights)	=	31.1035 "

APOTHECARIES' WEIGHTS.

1 Grain	=	0.0648 grammes
1 Scruple (20 grains) ..	=	1.296 "
1 Drachm (3 scruples) ..	=	3.888 "
1 Ounce (8 drachms) ..	=	31.1035 "

APPENDIX II.

PROPOSED ADOPTION OF A METRIC SYSTEM OF
WEIGHTS AND MEASURES.

FOR USE WITHIN THE EMPIRE.

From papers relating to above presented to both Houses of Parliament by command of His Majesty, February, 1904.

Summary of replies to the Circular Despatches of 9th September, 1902.

The metric system is already used in Mauritius and Seychelles.

The following are favourable to its adoption:—Australia, New Zealand, Cape of Good Hope, Transvaal, Orange River Colony, Southern Rhodesia, Gambia, Northern Nigeria, Gibraltar, British Guiana, Trinidad, Leeward Islands, Windward Islands.

And, with a reservation that it must also be adopted in the United Kingdom or in the Empire generally, Sierra Leone, Southern Nigeria, Ceylon, and Falklands. Hongkong would take common action with other colonies.

The States of New South Wales, Victoria, and Western Australia are also favourable, but, together with South Australia and Tasmania, consider that the matter is one for the Commonwealth Government.

Fiji is doubtful, but must follow Australia and New Zealand. British New Guinea would go with Australia. Jamaica and British Honduras need the adoption of the system in the United States of America. The practice of India is important to the Straits Settlements, who would be followed by Labuen, and the Bechuanaland Protectorate would follow the rest of South Africa.

St. Helena, Cyprus, Lagos, Wei-hai-Wei, Barbadoes, and Bahamas are on the whole unfavourable. The Gold Coast Colony and the State of Queensland are prepared to adopt, but consider that inconvenience would occur.

Natal cannot consider the matter until some general lines of legislation have been agreed upon by His Majesty's Government. No definite answer has been given by Newfoundland, Malta, or Bermuda. Canada has not yet replied.

THE THEORY AND PRACTICE OF FIRE INSURANCE BUSINESS.

By **BURDUS REDFORD,**
Of the Newcastle Insurance Institute.

[*This is one of two essays adjudged equal (first) in the competition arranged for at the Newcastle Conference in June, 1903, and to each of which a prize of £10 was awarded.*]

IN every community, from the primitive one
Introductory. where just sufficient civilisation is found to make
its members construct dwellings and accumulate
possessions, to that gathered in the great city of modern times, the
risk of fire is a continual menace. Whether the possessions be
merely hunting implements in a rude hut or the costly furnishings
in a millionaire's mansion, the danger is present to both ; and while
the primitive man could rely only on his own exertions or the
charity of neighbours to repair his loss, efficient protection against
this particular calamity is now found in Fire Insurance. It is
easy to discover early evidences that the fire risk was regarded as
one which could be provided against in some degree. Measures of
prevention, such as the institution of the curfew or regulations con-
cerning the construction of buildings, were enacted ; yet, although
insurance against other contingencies was practised and isolated
attempts were made to deal with the fire risk, it was only at a com-
paratively recent date that the problem was solved by the intro-
duction of the system which has found full development in the
modern Insurance Office. The great fire of London appears to
have been the starting point, and the experience necessary to
organise the business was rapidly attained, because the end of the
seventeenth and the beginning of the eighteenth centuries witnessed
the birth of companies whose prosperity continues at the present day.

Before proceeding to consider the subject of Fire Insurance in detail, it may not be inappropriate to glance briefly at two popular errors in relation to the matter. It is widely believed that so long as property is insured the occurrence of a fire is of little or no consequence. This, no doubt, is true to a certain extent so far as the individual is concerned, as his loss is confined to that arising from the dislocation of business which inevitably proceeds from a fire; but the community is the loser by the quantity of actual and potential wealth destroyed. The accumulated results of long periods of time or the finished products of numerous workers disappear irretrievably, and although the owner may receive compensation, a portion of the national asset has vanished and can only be replaced by expenditure of time and labour otherwise available for other work. Thus, the prevention of fire is a duty incumbent on the State and the individual alike. The State has in limited measure recognised this duty, but even at the present time the recognition is incomplete; and the individual plays his part in a way which only those can realise who have to deal with the large and ever-increasing number of claims which are due to causes entirely avoidable.

The other error is that which regards Insurance as a form of gambling. So long as an insurance may, in virtue of an insurable interest, be legally effected, the transaction cannot be a gambling one. The object of the gambler is gain: that of the man who insures is protection against loss. The one seeks excitement, the other security. No method of computation can predict with certainty the issue of a gambling transaction. On the other hand, it is certain that amongst a given number of buildings some will be damaged or destroyed by fire. It is impossible to foresee which individual property will be affected, but there exists the certainty that loss will arise somewhere. If, therefore, an Office by collating experience is enabled to predict approximately the amount it is likely to be called upon to pay in losses, the premium which it charges the insured is a definite consideration for a contingency quite removed from the region of chance. Invention may introduce an entirely novel set of conditions, and for a time the fixing of the rate may be more or less a matter of conjecture; but sufficient actual experience will soon be gained to put the rating on a sound basis.

This, then, is the fundamental theory of Fire Insurance — that fires occur with regularity sufficient to make it possible to fix a rate of contribution which, collected from individuals in a given area, will be adequate to pay all losses occurring within that area, to satisfy working expenses, and, in view of the possibility of conflagrations, to build up a reserve fund. It is contrary to human experience that all of many widely-scattered properties should be simultaneously lost. "Is it true" ? exclaims Bassanio, in amazement amply justified by the event,

"Have all his ventures fail'd ? What, not one hit ?
 "From Tripolis, from Mexico, and England,
 "From Lisbon, Barbary, and India ?
 "And not one vessel 'scape the dreadful touch
 "Of merchant-marring rocks ?"

In effect, presuming the risks are numerous enough, quite out of reach of each other and each of small value in comparison with the value of the whole, each may be said to be insured by the remainder. There are few owners of property fulfilling these conditions, with interests sufficiently great to admit of the operation of insurance in this its simplest form. The principle is, therefore, developed by the Insurance Office which undertakes to collect from many owners the share which each insured risk must contribute to make up the losses of the whole. The success or failure of an Office depends upon the ability with which it converts this theory into practice. It may err by fixing a rate of contribution too low; or the rate may be that warranted by experience, but the particular Office may not have sufficient of the class on its books. It is thus of the first importance to an Office that it should be able to discover what is the prime cost of recouping losses in any given class of risk, and then to be able to place on its books sufficient risks from that class to ensure the adjustment between premiums and losses. Naturally, the first step was in the way of classification. This at first took the rough and ready shape of ordinary, hazardous and doubly-hazardous, or some such form which served its day and gave place to better methods. The classification is now minute, and an Office which conducts its business on scientific lines is able to discover at once whether any particular trade is receiving more than it pays.

From what has been said above, it would seem **State or Muni-** that the ideal body to control Fire Insurance **cial Insurance.** would be the State. Compulsory insurance on all property would carry out the theory perfectly, but it is more than doubtful whether, even then, the interests of the insured would be better served than they are at present. It is notorious that the management of a Government Department is generally less efficient and less economical than that of a properly conducted private company; and consequently what might be gained in theory would probably be lost in administration, and the insured might find himself face to face with an increased rather than a reduced premium. Still less is it likely that Municipal Fire Insurance could be a success. The difficulty here would not be so much that of management. The restricted area would make success impossible, no matter how expert the conduct of the department might be. The suggestion that a corporation should undertake the insurance of its own property is one which invites financial disaster. The property of a corporation, leaving out of account minor buildings which would have small influence on the total, consists generally of several large blocks—municipal offices and town hall, public library, schools, or similar risks. If one of these were destroyed by fire, the effect would be to handicap the municipality for years. For a long period of time a corporation may not receive by way of compensation so much as it pays in premiums. If, however, it wishes to be its own insurer in the crude form usually advocated, it cannot be certain that this immunity will continue until a fund has been raised which will cover at least the maximum amount which might be lost through any one fire. Then, when the property is restored after a fire, a further period of immunity will be necessary so that the like process may be repeated. The matter is not one to be viewed merely in the light of what has been paid to the Insurance Offices, but consideration must be given to the amount of the liability which the Offices have undertaken in return. This alone should be enough to give pause to the advocate of Municipal Insurance.

The rating of risks in classes is the only
"Rated on its equitable method by which premiums may be
Merits." computed. The specious and much-quoted phrase,
 "Each risk rated on its merits," claims to perform
 the impossible. Even let it be granted that the merits are always

obvious, the demerits (due to the vagaries of the modern builder, or the occupier, or one of a host of other causes) become apparent too frequently only after a loss has taken place. Yet these are precisely the things which it was essential to know in order to secure rating on merits. In a given number of private dwellings a proportion of hearths will be found defective, or several housemaids will achieve eminence by blowing up the fire with a newspaper or using paraffin oil to assist it to burn; but if each risk is to be rated on its individual merits, the householder who sees that his hearths are secure or who prohibits his servant using such means of fire-kindling, has good ground for complaint if his rate be the same as that of his neighbour who neglects these precautions.

In point of fact, the rating of risks should be **The Fire Offices'** based on the demerits of classes, and this is the **Committee.** great achievement of the Fire Offices' Committee.

So long as each Office acted independently, its experience of certain risks was too limited to produce an accurate result, and there was always, under pressure of competition, a tendency to grant insurances at less than the cost price of the class. Hence, out of the necessities inherent in the conduct of the business, the Fire Offices' Committee arose, and is performing a work of ever-increasing usefulness. This body, which collates experience and frames tariffs and rules for the conduct of business, has been the subject of much prejudice. It is popularly believed that, so far as the public is concerned, the Committee exists merely for the inflation of rates. It would be more accurate to say that it exists for the improvement of risks. The gradual elimination of weak points through penalising them with extra rates, and the consequent decrease of fires arising from such weak points, must have resulted in a saving of no small importance to the wealth of the country. The justice of tariff legislation gets practical recognition from those whom it does not affect, when, as is frequently the case, works outside the jurisdiction of a tariff are constructed upon tariff lines (that is, on lines which would give them the benefit of minimum rates if the tariff applied). This in itself is strong evidence that the tariff is drawn for the benefit of offices and insured alike. The failure of so many companies which have been formed to combat tariffs is a further proof, if such be needed, that the dealings of the Fire Offices' Committee are not inequitable. It must not, however, be supposed that a tariff is framed on the

supposition that its rating will be adequate for every risk in a class without regard to the features peculiar to a particular risk. The tariff does not, and cannot, deal with changing features of which age of structure and untidiness on the part of a tenant may be taken as examples. The rate is fixed as a minimum, and may be increased if individual circumstances warrant.

No Office prefers to levy extra charges. It would rather desire that the necessities for extras were absent. Each extra means a weak spot or an element of hazard in the risk, and the removal of the former would be to the advantage of all concerned. Taking a tariff as the nearest approach to a scientific rating, it in effect says, "The risks of certain construction and uses in a particular class show a loss experience which is covered by a certain rating. This charge, then, must be made normal, or, in other words, the standard must be fixed by the risks which show the most favourable experience. Each risk falling below this level must, according as it does so, contribute extra rates. Should a building be of inferior construction an extra must be charged for that. It has been found that the increase of stories in height has a material effect on the loss ratio, and this must be provided against by an additional charge. Then, openings through the floors and wood linings to rooms have been shown to assist in spreading the fire. Stoves, too, have proved elements of danger. All these must be penalised, and so on through many other points." A system like this is to be welcomed rather than deprecated, because it puts the owner of the best risk on the most favourable footing which he can further improve by providing efficient extinguishing appliances. If an error in the rating is made, experience will accumulate to show exactly where it lies, and the necessary adjustment will follow. It is not possible for the Fire Offices to expect to reach the mathematical exactness which has been attained in calculating life premiums, but the only approach to scientific rating of fire risks is on lines such as have been roughly indicated.

From the necessities of its existence an Office should lean to the side of caution. The interests of Electric Light and Power. at stake are too great to permit other than cautious dealing if success is to be maintained. While there is, in Fire Insurance, no modern parallel to the enormous discrepancies in estimating risks which the Workmen's

Compensation Act disclosed amongst the Accident Offices, the recent development of electricity affords a good illustration of the disadvantages under which the Office labours when confronted with a new industry. The rates charged for electric stations were quite inadequate to meet the drain caused by the frequency of fires in them, but as a class these risks have shown an improvement as remarkable as it has been rapid. This is, no doubt, due to the advancement of electrical science and the strictness with which the Offices have watched structural and other defects in such works. The success with which electricity has been applied both to lighting and power, and the great extent to which one or the other is used in all kinds of risks, have replaced old elements of danger, from the Fire Insurance point of view, by new ones. While it is too early to say that these have been overcome, it is to be hoped that in the comparatively near future electricity will do much to diminish the losses at present regarded as inseparable from the use of artificial light and power.

Two further problems with which the modern Insurance Office has to deal are due to the same cause. The rapid increase of land values in cities and towns has transformed the comparatively simple risk into one of great complexity. In place of one building of small size with one tenant there is now the large structure in which many businesses are carried on. Each of these contributes something to the fire hazard, but in practice the accumulation of risk from this cause is not so great as might have been expected. The Offices have no alternative but to require extra premium for increased risk, and this is a direct incentive to owners either to remove objectionable features or to see that hazardous trades are excluded. Thus, the risk in a large building tends to be more one accruing from the presence of a number of diversified non-hazardous businesses, rather than from the presence of a hazardous trade dominating the whole.

As the small building gives place to the large, so those on the outside of a block are extended backwards until a considerable area is brought into one in which there is little to prevent a fire spreading over the whole should circumstances favourable to it occur. It is easy to condemn these congested areas, but, owing to the continued operation of the causes which brought them into

existence, they are more likely to increase than to diminish. Fire insurance is essentially a business which must deal with things as it finds them. It is undeniable that the amounts which the Offices may have to pay in consequence of any one fire are greater than ever, but they have no direct method of affecting these congested areas except through the premium, and it is not likely that they can ever hold out prospects of sufficient reductions in rating to bring about sweeping changes in such risks.

It is probable that the solution of these problems will be found not so much in improved construction as in more efficient methods of protection against fire, such as that afforded by automatic sprinklers. The value of this modern and highly effective system of fire extinction is sufficiently shown by the large discounts which the Offices allow for an approved installation. By it the fire is dealt with at its commencement, when it is within control; and if a thermostat system is added the combination forms the most reliable mechanical means at present known of avoiding serious loss by fire.

From what has already been said, it is evidently of the utmost importance that an Office should be put into possession of the fullest details with regard to all special risks. It is impossible to rely upon a proposer to supply these details, because the ideas of an owner or a tenant with regard to the danger from fire are generally of the most optimistic kind. In practice, therefore, the Office sends its own surveyor to take the necessary particulars and submit them to it in the shape of a report, supplemented when needed by a plan. To become a successful surveyor demands qualities of no mean order. In the majority of cases it is, no doubt, easy to state the situation and construction of a building, the trades of the occupiers, the general features of the risk, and the contiguous hazard, if any. After all, this is but a small part of what is required from a surveyor. The first essential is tact, without which ability is of comparatively little value. Then there must be an eye to detail, not merely as regards the main features, but those small defects which may have an undesirable effect on the after history of a risk, and the power to co-ordinate the whole so as to form a comprehensive and sound judgment. The surveyor, too, should be able to sum up those with

whom he is brought into contact. It is difficult to estimate the moral risk, but the successful solution of this difficulty by a surveyor must often have been the means of preventing an Office accepting a liability which would have resulted in loss of the most undesirable character. Added to this, a knowledge of every trade in his district should be either familiar to the surveyor or within his reach, and it is desirable that he be abreast of the latest developments of manufacture and discovery.

Having secured full details of a risk offered for
Retention. acceptance, the Office is in a position to deal with it. First of all, the Office must decide what amount it is prepared to lose on the risk, or, in other words, what proportion of the sum proposed it should retain as its own liability. In practice widely divergent views prevail with regard to retention. In the majority of cases the line of caution is followed, and the sum retained is small. This is specially desirable on the part of a young Office which has a position to make, and to which the accumulation of a reserve fund is of paramount importance. In any case, having decided what amount it can carry on the risk, the surplus amount of the proposal is offered to other Offices which indemnify the original Office for proportionate amounts. This system is a necessity if an Office is to accept anything beyond a comparatively small sum on a particular risk. While there are certain risks on which it is almost impossible to obtain guarantees and which consequently are shared amongst several Offices, each issuing a separate policy to the insured, in the majority of cases, the proposal is made to one Office only and it issues a policy for the whole. In case of loss the insured has then to deal with a single Office, although its share of the payment may be but a small part of what he receives. It is to be remarked, however, that the tendency of the Offices seems, year by year, to become less favourable to the latter practice.

An important detail in the successful working
The Street of Fire Insurance business is a system of indexing
Index. risks. If the Office wishes to guard itself against granting insurances for larger amounts than it can afford to run, it is vital that it should be able to see at once the total amounts it may have on any special risk. Even in ordinary cases it is eminently desirable that a policy should be easily traced. This has been more or less efficiently effected by means of street

books, clumsy in use, requiring periodical re-writing, and with the liability that one amongst a mass of entries might be overlooked. The card index, a method of comparatively recent growth and familiar in library catalogues, meets the difficulty, and with it there is little excuse for overlooking a risk.

Having, then, received the proposal and inspected the risk, the Office proceeds to write the policy. This document sets forth the contract between the Office and its insured, and as such should be drawn with all the care necessary in a legal instrument. Being prepared by one of the parties to the contract, any looseness of phraseology or lack of precision is liable to be interpreted in favour of the other party should the policy be brought into a court of law. The wording should be clear, and the description as terse as completeness will allow. It should not be burdened with irrelevant matter, and the phrase that the "risk is more particularly described in the Office surveyor's plan and report" is not to be commended. The insured is in no way responsible for the plan and report, and the phrase is of no use except as an office reference, which would be more conveniently made on the margin of the copy of the policy. There should be no verbal discrepancy between the printed and the written parts of a policy. What is more important, there should be no unintentional modification of the printed matter, because the written part, being applicable to the particular case, will override the printed which is drawn up for general application. For instance, although the printed part of the policy covers only loss or damage, if any article is specified as being of the value of a certain amount, it would be necessary to pay that sum in the event of the article being destroyed by fire, although the payment might bring a profit to the insured.

The policy, generally issued and renewable for The Insured, a period not exceeding one year, begins by setting forth the name or names of the insured. While it is not essential that the nature of the insured's interest should be named, it is eminently desirable that any interest other than that of absolute owner should be specifically stated. The general phrase, "for their respective rights and interests," is undesirable, because the mere fact of a policy being issued assumes an insurable interest in the property covered. It is impossible within the limits of an essay to deal in detail with the various forms an insurable

interest may take. Speaking generally, any person who would lose directly through a fire has an insurable interest in the property concerned. Where the interest is not that of absolute owner, the policy should be so worded as to cover that interest and no more. For example, the owner of an undivided share in any property should be indemnified only to the amount of that share, up to, of course, the sum insured ; and, to save misapprehension, the policy should state that, in case of partial loss, the Office will be liable only for the proportionate share it covers.

Having set forth the insured and his interest, the **The Property** policy proceeds to specify the property covered and **Covered.** this as concisely as possible, guarding by special clauses or warranties against elements of risk which if present would necessitate increased rating. The descriptive part of a policy should always be lucid enough to be understood by the insured without difficulty, for although he frequently does not supply the details for it, it is his duty to see that it accords with the facts. As a matter of office routine, all policies should be written on the same general lines, such, for instance, as the specifying of the building covered, its situation, construction, and, if not a private dwelling, height, modes of lighting and heating, tenure, and then the particulars peculiar to the case in hand. As a general rule, an item should read in an easy-flowing sentence which, even without punctuation, should contain no ambiguity, and which should give a complete description of the risk it deals with. The obvious exception to this is when part of a description is common to all of several properties included in one policy, when repetition is avoided by putting it in a clause at the foot. Apart from this, an item should be self-contained, and not, as is frequently the case, an item followed by a series of notes which have the appearance of after-thoughts. The proper clauses should be attached to the policy which is then complete. Two precautions must be borne in mind. Any liability which properly belongs to another company or body, the familiar instance of the "Marine Clause" being a case in point, should be excluded. If any other Office is known to be on the risk, the wording of the two policies should be identical. This latter requirement is in practice conveniently met by the issue of a printed specification prepared by the leading Office (that is, the oldest Office if each has the same amount of risk, or the Office with the largest amount if other-

wise), which each Office concerned attaches to its policy, the written part of the latter being confined to setting forth the proportion of the specification it undertakes to insure.

In view of the frequency of changes, either by **Endorsements.** removal or by the alteration of essential features of the risk, some method of modifying the contract is necessary. The issue of a new policy each time an alteration was needed would mean an increase of detail work which in practice would be found intolerable. The system of endorsing the policy meets this need. There is, it would appear, no limit (within the sum which the policy was issued to insure) to the extent of the alterations which may be effected by endorsement. The names of the insured may be changed, entirely different property covered, and some Offices even allow by endorsement an alteration of the total of the sum assured. It may be noted, too, that the signature of a director or officer is required to make the original contract binding, but an endorsement is valid if signed by an agent. Some Offices make a practice of issuing loose "endorsements" to be attached to their policies, but practical experience shows that a large proportion of these endorsements never reach their destinations.

The particular contract having, as indicated, **Limitations of** been set forth by the written part of the policy, **the Contract.** the printed portion specifies its limitations. The contract is purely personal as between the Office and an insured, and no transfer of interest can be made by the latter, the consent of the Office being required to any change in ownership otherwise than by will or operation of law. (The latter phrase must not, of course, be confounded with the legal process by which a sale is effected and completed.) The insured has no power to assign his interest in the policy. The Office regards the personal character of the insured an element in the risk, and must, therefore, reserve to itself the power of choosing those it is prepared to insure. Then, the contract is one of indemnity. It is a cardinal principle in Insurance business that no insured shall be allowed to make a profit from a fire. His contract entitles him to recover loss or damage only, and it is essential, both as regards public policy and the interests of its other insured, that an Office should, so far as it is possible to do so, see that this principle is justly carried out. Insurances on rent, which it is the practice of the Offices to grant,

would at first sight appear to violate this, but on the occurrence of a fire, the ceasing of rent from a tenant, or the necessity to make the payment to a landlord, constitutes a definite loss. The principle is fully safeguarded, as, if a building be unoccupied at the time of a fire, no claim for rent can be allowed. Further, in case of loss, the policy is reduced by the amount paid if the loss be partial, or entirely cancelled if the loss be the total of the sum insured. This is generally stated on the receipt which the insured gives the Office for its payment, but even if it were not, the payment of the loss frees the Office from further liability to the extent of the payment, until the insurance be revived by payment of further premium. The Office, having discharged its liability, would, if the policy were not reduced or cancelled, be in the position of granting a further insurance for nothing until the next renewal date.

The contract is further subject to certain conditions which are sometimes regarded with aversion by the lay mind. Now, it is impossible to conceive a contract without conditions of some sort—the one implies the other. The fire policy is not the only legal document in which conditions appear, yet conditions far more stringent than those it imposes are accepted if they happen to be part of a written deed. Few ratepayers are aware that they are fenced round with rigorous bye-laws, and most railway passengers travel without knowing the drastic regulations under which the company conducts its dealings. It will not be seriously argued that it would be to the public interest to abolish the bye-laws either of the town or the railway; and if mature consideration be given to the subject, the necessity for the Fire Insurance policy conditions will be apparent. It is most desirable that a contract should be drawn at the outset to meet any contingency that may arise under it. Legislation, to be effective, should be enacted before the occurrence of the circumstances it is framed to meet. Similarly, the ideal contract should be sufficiently defined to leave no loophole for misunderstandings to enter at any stage of its fulfilment. The conditions of the fire policy are the means by which it endeavours to meet this requirement. But in addition to defining the contract, the conditions are further directed against fraud. This is as important to the insured as it is to the Office, because whatever payments the Office makes must ultimately be borne by the insured as a whole, and anything tending to increase these payments (such

as laxity of conditions which would make fraud easier) is directly against their interests.

A brief reference will suffice for what may be called the more directly protective conditions. **Conditions—** **Misrepresentation** There must be no holding back or misrepresentation of material facts, and this applies not only to the time when the policy is written, but to the whole of its currency. **Misdescription.** The Office having received a definite premium for a definite risk is entitled to be informed when any change is made in it.

Another condition which makes it imperative that receipts, to be valid, must be on the Office's own forms and signed by one of its own officials or agents, makes its utility manifest without comment. And, too, the condition which makes fraud a bar to any claim simply emphasises the need that a contract based on good faith must have good faith throughout. The temptation to seek to obtain more than is due, and that by dishonest means, is occasionally too strong for an insured to resist, and the application of this condition must come as an unpleasant if wholesome surprise to those who attempt fraudulent dealing.

The condition specifying what the policy does **Exceptions to the** not cover is an important one as illustrating **Cover—** several points of practice. It was remarked above **Goods in Trust.** that the specific interest of an insured other than that of absolute owner should be inserted in the policy, and this is borne out in this condition by the exclusion of goods in trust or on commission unless specially named. Even where they are thus included by special mention, the phrase, "for which he is responsible," shows clearly that the Office does not contemplate giving an insurance which should be, and probably is, effected by some other person. The only cases in which the holder of goods belonging to another is made responsible by law for the value of property destroyed by fire in any circumstances, are those of the common carrier (when acting as such), the innkeeper, and the pawnbroker. Apart from these, the holder is not held responsible by the general law for loss from accidental fire providing reasonable care has been exercised, but by special agreement or custom of trade the liability may be placed on him.

Further exceptions from the policy, such as **China, Glass, &c.** glass, china, and the like, are "specially mentioned" most frequently of any of the excluded articles, as they are specifically named in policies covering household goods. It is not, however, necessary to mention these articles specifically if they are part of a dealer's stock in trade, the term "glass and china dealer," or even "lamp dealer" (whose stock must necessarily consist partly of glass), for instance, as a description of the insured, being enough to cover the articles.

Another principle is developed by the exclusion
Riot. of loss by fire through invasion, riot, and the like, which being possible only by defect in the protection provided by the local or other authorities, the remedy, if any, is properly against them and not against the Office.

The exemption from the policy of fire damage
Earthquakes. caused by earthquakes is one which is, fortunately, not of much practical importance in this country, but it embodies the principle that losses due to what was, in old documents, termed "the act of God," should be excluded. Lightning may be regarded as an exception to this, as liability for loss by it is specially accepted by the Offices, and they pay considerable sums annually under this head.

Then, again, although any explosion (except
Explosion. such as destroys a boiler by expansion of steam) in reality is a fire of the shortest possible duration, the risk of explosion is not accepted by the Offices. Here, once more, an exception to the exception is made by undertaking liability for loss or damage arising from explosion of coal gas. In the conditions of some Offices the word "coal" is omitted, and in such a case it might be contended that the policy would cover any explosion except that caused by gunpowder or some other explosive substance, or steam, but the expression, "elsewhere than on premises being part of a gasworks," clearly indicates the intention.

There is still another exception to be dealt with.
Spontaneous Combustion. Every insured is, in theory, supposed to exercise reasonable care for his property, although in practice it is difficult to draw the line. The Office cannot in justice be expected to recompense anyone for loss attributable to culpable negligence. So well is this recognised that there is no direct exemption of it in the contract, but the exception

under consideration indicates the underlying principle. Loss or damage through what is called "spontaneous combustion" cannot be recovered from an Insurance Office. Although, strictly speaking, it is impossible for spontaneous combustion to arise in any pure substance, the phrase may be regarded as a sufficient description of a phenomenon which has been reliably observed. Apart from contact with energetic chemicals, such as sulphuric acid with an organic substance, some of the most frequent causes of spontaneous combustion are due to the agency of water. The ignition of coal through the presence of iron pyrites, after being moistened with water, or the firing of hay from which the moisture has not been properly expelled, are the familiar instances. Again, oil in contact with substances such as charcoal or cotton waste produces a combination liable to set up heating and ultimately to burst into flame. Evidently, then, all these causes might by proper precaution be avoided. If the precaution is not taken, the loss rightly falls on those to whom the neglect is due. But it is to be observed that the exception is only to combustion in property arising from "its own spontaneous heating," and does not free the Office from liability for subsequent damage to other property. For instance, if a stack of hay fires through spontaneous heating, and ignites an adjoining stack, the primary cause of the destruction of both is spontaneous combustion. The loss on the latter stack is paid, although that on the former is excluded by the condition under notice. A fire to come within the scope of the policy must arise from an outside source. There must be something in the nature of an accidental application of heat—"accidental" being wide enough in its scope to include a bottle of fluid acting as a burning glass, a mischievous child playing with matches, or any contingency of a similar nature. The Office is not liable for damage arising from the intentional application of heat to the property destroyed. The reason for this is that the destruction, for example, of any substance in process of manufacture by heat necessarily applied in that process, is not a loss due to accident but to want of skill or neglect of precautions which should have been observed. A payment in such a case would mean recouping a man for his own carelessness, which would be undesirable in every respect.

The two conditions against which most objections are directed are those which deal with the procedure relating to the claim and substantiation of

The Claim.

it, and with arbitration. In the former a time limit is fixed, but although this is definitely stated, there is a provision (the quotation is from the conditions of one of the leading Offices whose policy throughout has been taken as a typical illustration) for "such further time as the company may allow." The need of a time limit will be granted at once, and it is difficult to believe that any Office would vexatiously withhold an extension from an insured whose good faith was unimpugned. Even if it did so, it would have considerable difficulty in avoiding payment on this ground alone, could it be shown that it was impossible to comply with the condition within the time stated. It is to be noted that the claim must be furnished and substantiated at the insured's expense (the Office indemnifies the insured against his loss but not against the cost of proving it), and supported by the production of such invoices, proofs, and explanations as may be necessary. A cardinal principle of Fire Insurance practice that no insured shall make a profit from a fire has already been referred to, and this condition gives it effect. The need of some proof of loss will be admitted. No business man desiring to remain in a sound financial position would make payments on the unsupported statements of another. He buys goods, but does not pay the account without seeing that the goods received correspond with those charged on the invoice. It is neither unreasonable nor undesirable that an Office should have proof that the amount claimed was actually lost. Indeed, such proof is necessary in the interests of the other insured, because if laxity in settling claims were general the rates at present in force would be found to be inadequate and the whole body of the insuring public would suffer. But, again, it is to be noted that the condition is not an uncompromising one. The account of the damage is to be produced and supported with all such books of account, invoices, and the like "as may be reasonably required." On the face of it, this is not the language of a party to a contract who intends to drive a hard bargain. It is well known that in private dwelling-houses, for instance, there must be many articles of furniture for which, owing to lapse of time, it would be impossible to produce invoices or accounts, but the wording of the condition does not make this production imperative. Even if the debris did not disclose the fact that certain articles of furniture were actually in the building at the time of the fire, the circumstances of the case would be exceedingly peculiar if evidence could not be produced to show they were there

immediately before. But, after all, in looking at this condition from the standpoint of the insured, the important thing is not the form of words. What is vital is how they have been construed in the past. That the spirit of the contract is loyally carried out by the Offices is shown by the thousands of claims which are settled every year without friction; and no honest claimant need be apprehensive that this condition will be pressed hard against him. In point of fact, the more quickly a settlement satisfactory to both sides is arrived at the better an Office is pleased.

In view of the increasing approval with which
Arbitration. both the Legislature and the courts regard and provide for the submission of disputes to arbitration, and the increasing use of this means of settling differences in all walks of life, nothing in the way of apology for the arbitration condition is needed. So long as men have somewhat of that temper which is known by the name of "perseverance in a good cause, and of obstinacy in a bad one," the occurrence of disputes will be inevitable, and a reference will be one of the most convenient ways of ending them. The machinery of a court of law could not effect the end any better, the expenses would be greater, and the time of settlement might be indefinitely prolonged. The evidence before the arbitrators would be the same as that which would have to be produced in a court of law, the methods of bringing it forward would be similar, and the arbitrators, being men practically conversant with the necessities of the particular case, might be trusted to bring the case to a settlement as equitable as could be effected by the court.

Another condition gives the Office power to
Reinstatement. reinstate, which, however, in practice is used as little as possible. The difficulties in the way of making a reinstatement entirely satisfactory to an insured who, from the fact of the reinstatement being necessary, has been found troublesome to deal with, are so many that an Office will act on this condition only as a last resort. Although cases may arise when it is found to be a necessity, the possibility of increased liabilities outside the immediate fire damage accruing during reinstatement is to be taken into account, and so the reluctance of the Office to avail itself of this condition is quite justified.

It cannot be too widely known that, in case of
Right of Entry. loss, the insured must safeguard the salvage effectively. He has no right to abandon any

property to the Office. Could he do so, the practical result of a fire would be to compel the Office to purchase the goods as at the date of the fire. But while this right is not given to the insured, the Office has the right of entering into possession "for a reasonable time." Again, the absence of arbitrary wording may be remarked. This right of entry does not entitle the Office to remain for an indefinite period after the purposes for which it entered into possession have been fulfilled.

A further condition limits the Office's liability **Other Insurances.** to a rateable share of the loss should the property be the subject of other insurances. And in the same manner another condition places the insurances on a risk on a similar footing if one of the policies happen to be subject to average. With regard to the limitation of the payment to a proportionate part of the loss, modern practice has extended the principle so that in case of an Office insuring a proportionate part of a schedule, it shall be liable only for a similar proportion of any loss which may occur. This, in effect, makes the owner his own insurer should he fail to keep the insurances up to the full amount of the schedule.

The condition which provides for the subroga-
Subrogation. tion of any rights the insured may have, gives effect to the theory that the payment of the loss places the Office in a similar position to that which the insured would have occupied had no insurance existed. All rights of recovery from other persons belong to the Office in consideration of its having satisfied the insured's claim. The insured's remedy lies either against the Office or the persons who are the direct cause of the damage (such as a gas company in the case of explosion due to a defective main), and he generally accepts the protection of his policy, leaving the Office to recover from those primarily liable.

The development of the tariff system and its
Warranties. methods of penalising defects by requiring extra premiums, has led in recent years to the convenient practice of issuing forms of warranties, and by the simple method of excepting those to which a particular risk does not conform, the writing of complicated descriptions is avoided. This system has been responsible for the addition of another condition to the policy, which make the warranties attach during the whole of the currency.

An important condition not usually printed amongst the other conditions on the back of the policy, but generally attached to it or printed on the face, is that known as the condition of average. This condition, which provides that if the sum insured be less than the total value of the property covered the owner shall bear a share of any loss in proportion to the deficiency, is a simple means of ensuring that the Office shall not grant insurance for which it does not receive premium. The average condition is most used in cases where several risks are included in one sum insured. By a little ingenuity an insured, in the absence of the average condition, might so arrange his risks that a small premium would (except in the remote contingency of many fires starting simultaneously at different points) protect him fully for an aggregate large amount. The ideal spot for such a practice would be a farm, where, without the average clause, a farmer could so dispose his crops that he might enjoy what was a large insurance by paying premium on a fractional part of it. In practice, property in the open or spread over several buildings can now be insured only if subject to this condition, notable exceptions being agricultural implements and live stock on a farm. Where, as on a farm, the property covered is so scattered that it is practically impossible for it to be all in danger at once, the ordinary average condition becomes inequitable. To meet such and analogous cases there is a special condition of average which is inoperative if the sum insured represents 75 per cent. of the total value of the property covered. What is known as the two conditions of average is confined to certain mercantile risks. The first of these two conditions is the ordinary average condition, while the second, should there be a policy specifically covering the goods where the fire occurs, exempts the Office from liability except so far as regards any excess in value over the insurance by the specific policy.

The British practice in regard to the application of the average condition differs widely from that prevailing on the Continent. There, the average condition is extensively applied, but here its use has been generally confined to insurance on property not in one building. It is instructive, however, to note that the tendency is towards a wider application of the average condition in this country. In manufacturing risks it is now common to apply

it, either *pro rata* or 75 per cent., even though only the building or contents of a single place are involved. In such cases the justice of its application is undoubted, and the universal application of it, as is frequently advocated, would entail no hardship on the insured. It is open to question, however, whether in case of small insurances, such as the common run of household goods, its benefit would not be counterbalanced by the inconvenience which would follow its application. An insured may, of course, reason with himself that the chances of the total destruction of his furniture are small, and, therefore, may be inclined to take part of the risk himself. It is not probable, judging from the result of claims which may be taken as an index, that such cases form any important proportion of the whole, and consequently the application of the condition might not yield much in the way of revenue, while it would, especially in the case of a trifling loss, lead to detail work irksome both to the insured and the Office. On the whole, the tendency to extend its application to special risks and to allow the non-hazardous to remain as at present seems to be the desirable course.

Such, then, in briefest outline, are the policy conditions, any one of which might well serve the purpose of a complete essay if it had to receive full consideration. To the student of Fire Insurance business their history is valuable as indicating the lines on which theory and practice have been developed. If the conditions were banished from the policy would the insured be in a better position? The conditions are merely an expression of law and custom gathered from the experience of years, and if they were abolished neither law nor custom would be annulled. They are not arbitrary laws to deprive any one of what should be rightly his, and no fair-dealing man need fear that they will be used to enforce a technical point. No honourable man would seek to evade liability under a deed simply because it was not properly stamped. Neither does an Insurance Office frame conditions to evade liability deliberately accepted. No Office could survive long if it earned the reputation of being unfair in its dealings. As a matter of fact, in the aggregate, numerous claims are paid every year for which, strictly speaking, no legal liability exists. While the individual insured has little to fear from the dealings of the Office, the latter must safeguard itself against possible fraud on the part of the insured. It is only fair to add that fraud is infrequent,

but the day has not arrived when a contract may safely be made to pay without conditions on the occurrence of a definite event. In the meantime, while fraud is a factor which must be reckoned with, the probity of those in whose hands the conduct of Fire Insurance business rests may safely be entrusted with the task of giving fair dealing to the honest insured and proper treatment to those who are otherwise.

Much has been said about the loss, and a reference to the means whereby it is settled is now necessary. On receipt of the claim the Office sends a representative to verify it and effect a settlement. This representative, except in the case of trifling losses, is not one of the permanent staff of the Office, but a valuer of special experience. It is considered by some that the employment of one outside the Office staff gives an impartiality in dealing which would be absent if the assessor were permanently attached. It is, however, to be feared that the insured with whom this would have weight are just those who would be incapable of seeing any difference between the two. In the ultimate the matter is one of convenience. While, in large centres, the work of settling losses might give constant employment to a permanent official, in smaller districts this would not be the case. Besides, the work falling to the lot of assessors demands a wider experience than it is possible for any one man to attain. The present system puts the Office in a position to choose the valuer it considers most fitted to deal with each particular case as it arises, and, on the whole, it is difficult to see that much, if any, improvement would be effected either in the way of economy or smoothness of working if the Offices kept the loss settlement in the hands of their own staffs. One strong point in favour of the permanent official being employed is that a personal inspection would be made of all losses, no matter how small the claim. In cities where the frequency of fires makes it possible to employ an assessor for all, this is practically done; but in outlying districts many small claims which might with advantage have personal investigation are paid without one, or with no further inspection than that of the agent who is not unwilling to see his client obtain a generous settlement. The effect of the knowledge that each fire would come under the scrutiny of a competent valuer would be beneficial, and the small claim due to carelessness which is imposing an ever-increasing burden on the Offices, might reasonably be expected to become less frequent.

The history of an appreciable proportion of the causes of losses is that of things which might have been expected, because carelessness, in one form or another, is a frequent cause of fires. If the losses due to this could be eliminated from the accounts of the Offices the result would be a considerable saving in the aggregate. Apart from this, the means by which fires are caused, and which no ordinary foresight could have anticipated, are practically infinite. A familiarity with the causes by which fires are most frequently started is a valuable asset in carrying on Insurance business, for a knowledge of what has proved dangerous in the past is the best means of avoiding it in the future. With regard to those losses of which the causes are unknown there is in some quarters too much tendency to suspect incendiarism. While there are, no doubt, mischievous persons who set fire to the property of other people, the proportion of those who set fire to their own for the sake of securing the insurance money, and who remain undiscovered, must be almost a negligible quantity. Fortunately, an insured when he sets out on such an enterprise is generally at so much pains to make things sure that his scheme is evident. So long, therefore, as ordinary causes may have been at work it is better to adopt the more healthy view and regard the insured as innocent until he is shown to be guilty.

Although not strictly a question for the Offices, the extinction of fires has by custom become one. In tracing the ultimate bearer of the fire loss it was seen that the community at large was the loser, and, therefore, upon the community should fall the duty of providing efficient means of dealing with fires. If there were no appliances of any kind provided, and a total loss resulted whenever a fire broke out, the Offices need not necessarily be in a worse position. The insured, however, would not find his position improved, as an adjustment of rating to the loss experience would be made, and the burden be again distributed amongst those who were prudent enough to insure. One of the first duties of a Government is to safeguard the national property. While huge sums of money are annually spent on the army and navy, and protection for both person and property is further provided by the police force, fire, which annually levies so heavy a tax on the national wealth, is dealt with more by caprice than by system. In large towns a fire brigade

of more or less efficiency is supported out of the rates, but the establishment of this means of checking fires is generally left to voluntary effort in country districts. At present, if a brigade is to be established, it is thought quite fitting that a small rate (voluntary or otherwise) should be supplemented by generous contributions from the Offices. The effect of this, if it could be carried out in the way its promoters desire, would be to make the prudent man who is insured contribute twice—once, directly, in his private capacity, and again, indirectly, from the premiums he has paid to the Insurance Office. In principle every citizen should have at his disposal the most efficient means of checking fires which the locality can afford, and these should be at his service without charge. There can be no objection to granting fair out-of-pocket expenses to any brigade for its attendance at a fire, even if after being called it arrive too late to be of service, but nothing in the way of profit should be allowed. If it is not to the public interest that an insured should make a profit from a fire, neither is it so that gain should be obtainable for extinguishing it. The Legislature recognises the importance of extinguishing fires when it provides that no charge can be made for public water used in doing so. It should also see that means are provided for using the water efficiently. Local conditions must vary, but it would be a very small centre of population which could not be provided with some means of fire extinction.

As the system of insuring property extended it
The Agent and was found that the convenience of all parties was
the Branch better served by premiums being payable locally
Office. rather than having them sent to a central office.

By a method which made it possible to pay premiums to the representative of the Office in every village there was, too, a much greater chance of the policies being kept in force. The agency system was therefore a natural growth, and it has been a great factor in developing Fire Insurance business. The same necessity which produced the agent has given rise to the branch office. As the scope of insurance extended, questions were continually arising with which the local agent could not deal, and which could only with difficulty be dealt with from the central office. In consequence the branch office has become familiar in all great centres of industry, and while at its inception a branch must be a source of additional expense to the Office, in the course

of time, under efficient management, it becomes a valuable feeder instead of a drain. The strong local hold gained by many of the Offices by the early opening of branches has given them a position which rivals coming later into the field are each year finding more difficult to assail.

The development of the branch system, and the consequent gathering together at various centres of numbers of men engaged in a common calling, led to the formation of associations for business or social intercourse. After doing much practical work of an educational nature, the scattered institutes were, in 1897, gathered together in the Federation of Insurance Institutes of Great Britain and Ireland. The influence of this body is likely to prove as important with regard to the improvement of the *personnel* of Insurance as that of the Fire Offices' Committee in relation to the improvement of the fire risk. The aim of the Federation is efficiency. It concerns itself with every branch of Insurance, and recognises that in the working of the business there is scope for the highest intelligence adequately trained. By a well-considered scheme of examinations it raises the standard of knowledge of those employed in the business, and by publications and other means it affords opportunities to attain both theoretical and practical efficiency. Not the least important feature of the work of the Federation has been the successful establishment of an Insurance Clerks' Orphanage. This institution provides a means by which a member may make certain that, in the event of his early death, his children will start life without the handicap of a deficient education. The value of such a scheme can only be fully appreciated by those whose misfortune it has been to need the help without receiving it. The generous donations of many of the Offices and of those in the higher ranks of the Insurance world have been well seconded by the contributions received from the rank and file. The subscription securing to a member the benefits of the institution is merely nominal and within the reach of all who can need them, while the worthiness of the objects involved should appeal strongly for the support of those whom circumstances or fortune have placed beyond the necessity of seeking the protection the Orphanage gives.

Books dealing with the practical side of Fire Insurance business were until recently few in number. Indeed, a chapter added to a work

devoted to Life Assurance was considered all that was due to Fire Insurance. But within the last few years this has been changed. A most valuable branch of the work of the Federation has been the issue each year of a Journal containing papers selected from those read before the various Institutes. These Journals, from the variety and scope of the subjects dealt with in their pages, bid fair to form within a very short time an encyclopædia to which anyone wishing for information on Insurance business will turn. Already the volumes published form a reference library of considerable value. But what is perhaps more important in connection with them is the emphasis they have given to the fact that Fire Insurance bristles with technicalities either inherent in itself or as wide as the range of the risks it covers. In the course of a short time this may be expected to lead to the publication of standard works dealing with Fire Insurance more exhaustively than is possible within the limits of papers. Hitherto the prospects of a book on any branch of Fire Insurance paying expenses have been at least doubtful, but with the wider public which the pioneer work of the Federation has created, the publication of a work on the subject may now be expected to bring its author more material rewards than the consciousness of having supplied valuable assistance to his fellow-workers.

At a time when the disparagement of British institutions has been brought to a fine art, it is gratifying to point to some whose prosperity increases without check. The imposing millions of the annual premiums received by the British Fire Offices, and the still more impressive hundreds of millions of the sums they insure, are eloquent of the vast interests gathered around Fire Insurance. For stability and high integrity the reputation of our Offices is world-wide. Two centuries is a comparatively short existence to look back upon when the future lying before the Fire Offices is contemplated. Each year brings new vigour to that which is already robust, and ever-widening experience and sounder scientific methods place the practice of Fire Insurance business more firmly on the broad foundations of knowledge and strength.

THE THEORY AND PRACTICE OF FIRE INSURANCE BUSINESS.

By PAT. B. CARPHIN,
Sun Insurance Office, Dublin.

[*This is one of two essays adjudged equal (first) in the competition arranged for at the Newcastle Conference in June, 1903, and to each of which a prize of £10 was awarded.*]

THE genesis of most great movements, whether of a political, religious, philanthropic, or industrial nature, can be ascribed to some individual, or group of men, struggling often against overwhelming odds and overcoming well-nigh insuperable obstacles; but Fire Insurance as it exists to-day is the gradual evolution of centuries, its inception lost in the dim distance of antiquity. Writers on insurance history tell us that the almost inarticulate gropings after the abstract idea, with which in its concrete form every one is now so familiar, can be traced back to Aryan sources centuries before the dawn of the Christian era, while there is also evidence of the existence of a primitive communal application of Fire Insurance in Assyria nearly three thousand years ago. Of the unknown pioneers of insurance it might well be written, as of Sir Christopher Wren, *Si Monumentum quæris, circumspice* (if you seek a monument, look around), for their most eloquent tribute and lasting memorial is to be found in those Companies which exist to-day, dependent on, yet sustaining, the commerce and prosperity of the whole world.

Fire Insurance in its embryonic stage would seem to have taken the form of assessment on the members of societies or guilds in a manner almost identical with that adopted by modern friendly societies, but even as far back as the time of the Anglo-Saxon

Guilds, for which is claimed the honour of having originated the custom, we find in vogue the present-day practice of fixed contributions being made to the common fund. Nor does modern practice differ in its fundamental elements from the principle of mutual protection which was universal in these far-away centuries, for in spite of the apparent change brought about by the establishment in the early years of the eighteenth century of proprietary Companies, which renders the similarity less striking, the system of mutual protection still remains the key-note of all Fire Insurance.

Our present-day Insurance Offices are, after all, nothing more than an intermediary agent distributing the burden of the fire loss of the individual policy-holder among his fellow policy-holders throughout the entire country, so that, as Mr. Moore says, "the burden of helping one who is unfortunate will be lightly felt by all." Insurance is, in fact, a gigantic system of co-operation organised by the Insurance Companies, each of whose policy-holders secures a certain measure of indemnity against the possibility of loss by contributing to indemnify others similarly situated. It is therefore self-evident that a trading deficit can only be adjusted by asking for increased contributions to the funds which the Insurance Companies administer, while, on the other hand, an excessive trading profit leads either to reduced contributions or to their equivalent in the shape of increased benefits. The community of interest between the insurer and the insured is thus obvious, as also is the fact that both are mutually concerned in anything which tends to diminish the national fire-waste. This fire-waste is an absolute economic loss of wealth which cannot be reinstated. It can be, and, as has been shown, is alleviated by the system now under consideration, but Fire Insurance is not in itself a producer of wealth. It does not, at least directly, attempt to prevent accidents or even to protect men from all the consequences of them. It deals only with the main pecuniary loss which such accidents may involve, for it does not protect the sufferer against such consequential damage as loss of trade, or of prospective profit. The apparent anomaly to be found in the insurance of rents, rates and taxes, of improvement in the value of whisky in bond, or in the insurance against consequential damage to the perishable contents of such risks as cold storage warehouses, is not really a deviation from the common rule, for underlying it all the guiding principle remains unchanged.

A Fire Insurance policy, as the law of this country has very

properly decided, is essentially a contract of indemnity and nothing more, that is to say the insuring Company undertakes to replace its policy-holders in the same position as they occupied immediately anterior to the occurrence of any fire through which they may suffer loss. It will thus be seen that the contract of Fire Insurance differs materially from that of Life or Marine Insurance, inasmuch as it is not an agreement to pay a specified sum on the occurrence of a specified event, but merely to compensate the insured for any loss which he may sustain so long as that loss does not exceed the amount named on his policy. In other words the sum insured is the limit and not the measure of his claim. If it were otherwise, Fire Insurance could only be alike inequitable and meretricious, putting a premium on legalised dishonesty, if not actually serving as a direct incentive to incendiarism and other crimes. Fortunately, however, unless its essential nature be violated, Fire Insurance can never be made a source of profit to the insured. Strict impartial justice in the settlement of losses should be meted out to every man without fear or favour, but there are times when Insurance Offices waving the banner emblazoned "prompt and liberal settlements" tend to create an erroneous impression in the mind of that apotheosis of ignorance, "the man in the street." Tardy and cheese-paring settlements are as unfair to the insured as they are unworthy of any respectable Office. Insurance Offices exist to pay losses where they arise, not to avoid them, but to mislead the public, by specious announcements of this sort, into believing that they will be paid more than twenty shillings in the pound, is wrong in every way. These vain-glorious Offices would apparently like the public to forget that they are merely trustees for their policy-holders, of whose money they are the custodians, and of whose interests they are the guardians, and that to close the mouth of an over-grasping claimant with a monetary sop in excess of that to which he is legally or even equitably entitled, is a dereliction of duty. Moreover, a reputation for over-liberality in the settlement of claims is bound to attract undesirable clients, so that, like the gift of Midas, it eventually proves not a blessing, but a curse.

Out of this doctrine of indemnity arise two very important points in Fire Insurance practice. In the first place, should a loss occur the option rests with the insuring Office, and with the insuring Office alone, to fulfil its contract either by the reinstatement of the damaged property or by the payment of the actual value of the

damage done. While the insuring Office's option of reinstatement is a very convenient, but perfectly fair, means of overcoming the difficulty of settling losses in the case of involved interests, or of bringing within reasonable limits the pretensions of exaggerated claimants, it must be exercised with some degree of care, because when once the election to reinstate has been made no unforeseen difficulty or inconvenience short of impossibility will absolve the Office from fulfilling its obligation. In actual practice the option of the reinstatement is rarely exercised, and then only in very exceptional circumstances. In the second place no such thing as abandonment is permissible, "abandonment" being the relinquishment by the insured to the insurer of the salvage left after a fire and insistence on full payment of the sum insured. Moreover, it is the duty of the policy-holder to take care of all damaged or salvaged property and preserve it from further injury.

Some strange complications arise in case of loss where several persons are interested in the identical property destroyed, yet one cannot help feeling that the existing arrangements as to subsisting insurances are directly contrary to all commonsense and to the principle of indemnity which, as has been stated, is the fundamental principle of insurance. Take, for example, a hypothetical case where three persons (each of whom has an insurable interest, although these interests are conflicting) effect independent insurances on the same building. A is the ground landlord, B is the owner of the building, and C is the tenant under a long lease which compels him to maintain. A can insure because in the event of the total destruction of the building the security for his ground rent is gone unless B is otherwise a man of substance; B can insure because the building is his, and C might possibly fail to maintain his insurance, or he might be a "man of straw," or he might even be sufficiently dishonest to decamp after the occurrence of a fire; while C insures because his lease compels him to do so. Under the arrangements which at present exist any loss which may occur is shared by the three insuring Offices; yet so long as C's insurance is adequate, and nothing unforeseen occurs, A and B have sustained no loss, and consequently they have no right to make any claim on their insurers. Supposing, however, that C does not reinstate the building, or the amount of his insurance will only enable him to do so partially, then B's Company would be called on to indemnify him against loss, but still A has sustained

no loss and has consequently no qualification for restitution. In defence of the existing state of affairs it is, of course, alleged that B's Office would be drawing premiums for running only a limited risk and A's for running an infinitesimal one, yet since A and B inferentially admit by insuring the building that they *do* run a risk, however small that risk may be, and ask their Offices to saddle themselves with it, these Offices would be morally justified in accepting the premiums. There is frequently great friction between A, B and C, but for the Offices to ignore the liability as between man and man, pool the loss and leave the three to scramble for it, seems hardly in keeping with the theory of the business. Why the familiar rule of "exhaust the more specific policy first" should not be applicable in such circumstances as this is a mystery.

Another general characteristic of the Fire Insurance contract is that it is a personal one, entered into between the Insurance Company and the property owner who seeks indemnity. Strictly speaking, it is not the property, but the policy-holder, that is insured. No Fire Insurance policy covers buildings or goods as such; it is purely a guarantee of indemnity to their legal possessor against loss arising out of their destruction. In order to have what is known as an insurable interest a person must, as a general rule, be the actual owner of the property; at all events, he must have a direct financial interest therein, or must be legally—not merely morally—responsible for its safety.

The conditions found on the policies issued by the various British Fire Offices, although not uniform, are very similar in their general outlines, and have for the most part stood the test of a long practical experience. They may be classified roughly under three heads, (1) those which epitomise the common law, (2) those which lay down rules of procedure under certain circumstances for the guidance of the policy-holder, and (3) those which are designed more especially in the interests of the insuring Office. To dispense, as has been suggested, with the use of conditions would be a retrograde movement, beneficial neither to the Companies nor to the insuring public. Simplicity is in itself a most desirable thing, but it is not everything. There is nothing which an Insurance Company desires more than freedom from disputes or misunderstandings with its policy-holders, no matter how much the latter may be at fault, but to issue a document which is deceptive in its

simplicity would sooner or later lead to trouble. Such a thing as a conditionless policy is a practical impossibility, and a policy with unknown restrictions would be prejudicial to the interests of all, and more especially to those of the policy-holder. "It is more important," says Mr. Kitchin, "that the public should thoroughly understand their legal position and what they have to do in the event of a fire occurring to their property than that they should have a policy which could only be interpreted to them by a lawyer skilled in insurance law" whose bill of costs, it might be added, would also increase the cost of the insurance. Most people are agreed that the less lawyers have to do with insurance disputes the better for all parties, because the lawyer looks to the wording of the contract with an eye to its strict interpretation, while the fire underwriter, despite the popular delusion to the contrary, looks also to the equity of the case, recognising the truth of the old saying that what may be good law may be bad justice. Few people, therefore, would deny that between honest persons a contract, the terms of which are clearly defined, is better than one which would in all probability lead to discussion and consequent loss of time after a fire had occurred.

Another point, upon which there are many popular misapprehensions, is the insertion of the Average Clause in Fire Insurance policies. The use of this clause is not universal, the majority of policies met with in this country being without the mystic words "Subject to Average." A different rule, however, prevails on the Continent and elsewhere, but at home this clause is only used under exceptional circumstances, or wherever several unconnected properties are insured in one sum. As to its justice there can be no divergency of opinion. "It would be as unjust," says a recent writer, "to insure the properties of two owners at the same rate, the one insuring for 50 per cent. and the other for 100 per cent., as to assess the values of their properties for the purposes of municipal or State taxation on different percentages of value." The Average Clause is absolutely inoperative either in the event of a full insurance being carried, as theoretically it ought to be, or in the case of the total destruction of the property which is the subject-matter of the insurance. In effect it says to the policy-holder—"If you do not insure to the full value, you shall bear a share of any loss which may occur in the proportion that your under-insurance bears to the value of the property to which this

policy refers." It will thus be seen that the Average Clause has no terrors save to the person who seeks to take advantage of his more prudent brethren who insure fully.

Insurance Offices are, as has been stated, the intermediary mechanism for distributing to their claimants the contributions received from their policy-holders. As there is probably no aspect of Fire Insurance business regarding which the public entertain greater misconceptions than the basis upon which these contributions—better known as "premiums"—are calculated, the subject calls for more than a passing reference. Superficial thinkers not infrequently argue that insurance is only a euphemistic title for gambling, but when possibilities are converted into probabilities, when the laws of chance are subverted by the doctrine of averages and reduced to a system which, if not thoroughly scientific, has at least withstood the test of time, gambling ceases to be gambling. A recent American writer puts the case very neatly when he says that the whole essence of Fire Insurance business is the "art of making both ends meet." Fire underwriters cannot, like their actuarial brethren, reduce their facts to mathematically exact tables and formulæ. Sympathetic actuaries have at various times tried to attain this "consummation devoutly to be wished," and endeavoured to deduce from Fire Insurance statistics tables as helpful as their own, but have given up the self-imposed task on reaching the *reductio ad absurdum* stage, and retired, no doubt, with a wholesome respect for the fire underwriter and his "rule of thumb." A Fire Insurance premium is not a simple, but a composite, payment consisting of the quota of:—

1. Nett cost of indemnity.
2. Managerial expenses.
3. Agency commission.
4. Shareholders' profit.

If the past history of Fire Insurance be studied, it will be found that the system of differential rating dates from 1680, when the old "Phoenix" charged 6d per £ of rent for brick-built houses, and *double for timber*. Then in 1721 the "London Assurance Corporation" carried the system one step further by classifying risks under three headings—(1) Common insurances, (2) Hazardous insurances, and (3) Doubly hazardous insurances. From such crude beginnings sprang our modern complex system of classi-

fication to which in recent years an increasing attention has very deservedly been given, for it is now conceded that it is only equitable that each class of risk, or department of trade, should be self-supporting. Corn-mill rates, for instance, are not adjusted with an eye to a possible deficit on, say, boot factories. If this were done the voice of the "jolly miller" would soon lose its tone of joviality, and the justice of his complaint could hardly be ignored. But the system of classification goes into even greater minutiae when, for example, English corn-mill rates pay English corn-mill losses, Scottish pay Scottish, and Irish pay Irish. In fact, the subdivision, both as regards classes of risk and area affected, goes on as far as is possible consistent with the well-known fact that fires run in cycles of prosperity and adversity, and that an epidemic of fires may suddenly attack a town or district long immune from such visitations, or, again, it may run in classes, as, for instance, the cotton mill fires of 1882.

It is therefore important that the fire underwriter should base his calculations on statistics obtained over a fairly wide area and over a long term of years. An average which applies over a wide area and a long term of years may or may not be traceable when either is more restricted. Certainly it is less reliable, but experience shows that averages calculated on these lines, based on large groups of very nearly homogeneous risks, may be accepted as fairly trustworthy. The "fire cost" of an individual Office is consequently less reliable than the average "fire cost" of many, and this is one of the most forcible arguments not merely against the specious promise of "every risk rated on its merits," but in favour of such organisations as our tariff system. "The goal to be kept steadily in view," as a writer in the "Post Magazine" recently remarked, "is the attainment of a scientific system which shall result in a state of prosperity more regular and continuous than can be hoped for under present conditions." The Universal Mercantile Schedule, used in certain parts of the United States, seems to approach much nearer perfection than even the most up-to-date cumulative tariffs of the British system, but this country is not yet ripe for its introduction here. Much more, however, might be done at home in the direction of the introduction of some universal detailed system of classification and the collation of the results over a long term of years.

To carry the thread of thought still further, the doctrine of

averages reveals the fallacy of self-insurance. It is not an easy thing to convince the public that a chance must be paid for, however it turns out—that even though many of them never have a fire, the possibility that they may have one has a monetary value. An economically inclined house owner, for example, often thinks that he might as well throw his money into the sea as pay away his annual 1s. 6d. per cent. without any tangible benefit; but he never seems to realise that if he were to start a private insurance fund of his own it would take nearly 102 years (101·9, to be precise) for his annual contribution, accumulated at 4 per cent. compound interest, to amount to the sum for which an Insurance Company would give him immediate protection. Conversely the conclusion is unavoidable that since a plurality of individual risks is essential to successful underwriting, an Insurance Company cannot, with any degree of safety, accept risks in a half-hearted way. All things being equal, the number of individual risks of an analogous class cannot be too numerous. Unless, therefore, an underwriter can secure a sufficient number of separate risks of a particular class to give him the basis for an average sufficiently wide to restrict violent fluctuations in his “fire cost,” he would be unwise to accept any risks of that particular class. It is largely for this reason that the sound underwriter looks askance at new processes of manufacture. He has not only to face the problem of unknown machinery, new processes, and possibly, even, materials which may be capable of developing certain fire-raising or fire-supporting capabilities on a hitherto unknown scale, but he has no past experience to guide him and no plurality of similar risks to enable the doctrine of averages to apply. As a logical sequence these remarks are equally applicable to Companies making a speciality of a specific class of risk, or engaged in merely local as opposed to general operations. If this theory were untenable we would not see Offices originally founded to transact the insurance business of some particular trade group, or locality, seeking safety in general insurance business, or increasing their sphere of operations.

It is obvious that this task of selection, collection, distribution, and other necessary work cannot be done without expense, and it is equally obvious that, since it is primarily done for the benefit of the policy-holders, the cost of it should be shared by all.

The necessity of absorbing approximately 16 per cent. of Fire Insurance premiums in agency commission is one of the numerous

inexplicable instances of human eccentricity. In a co-operative system such as Fire Insurance, admittedly indispensable to all business men, it is remarkable that the insurance agent, theoretically an unnecessary middleman, should exist at all. He not only exists, but flourishes, and has indeed become such an integral part of a Fire Office's mechanism that a manufacturer offering his business across the counter of the majority of Offices would be received, not with effusion, but with suspicion. Life Assurance Companies suffer in the same way, and those few who have attempted to deal direct with the public have not achieved such a success as to justify any departure from the old system of "tempered self-interest."

Dr. Adam Smith, in his well-known work, "The Wealth of Nations," says—"In order to make Insurance, either from fire or sea risk, a trade at all, the common premium must be sufficient to compensate the common losses, to pay the expense of management, and to afford such a profit as might have been drawn from an equal capital employed in any common trade." The shareholders' capital is really the policy-holders' sheet-anchor of safety, and much of what goes to the former in the shape of dividends is really the interest on their own invested funds. It has been calculated that the average ratio of profit earned by the British Fire Offices during the ten years ending 1895 was 6.5 per cent., but all is not gold that glitters, nor does all that is called profit find its way into the pockets of the shareholder. The memory of the public is proverbially short, but underwriters have not yet forgotten the lessons of Chicago, Boston, and elsewhere. Reserves and conflagration funds require to be periodically replenished. The cost price of Fire Insurance is always an uncertain and variable quantity, and it must, for obvious reasons, be fixed in advance. The possibility of an abnormal and unforeseen call upon the resources of Insurance Companies must not be overlooked, and renders some slight margin of safety necessary for the security alike of insurer and insured.

A dispassionate survey of the position reveals, then, the fact that the maintenance of adequate rates is of vital importance. The credit of the merchant, the security of the financier, and the safety of the property-owner depend, to a very large extent, upon the financial stability of Insurance Offices. Unrestricted competition, therefore, which can only degenerate into a mad rush for business at any price, primarily affects the Offices, but it is ultimately

hurtful to the public. To some extent competition is regulated by mutual arrangement between certain Offices—colloquially called ‘tariff’ Offices, in contradistinction to “non-tariff” Offices—which retain their individual independence. An impression prevails in many quarters that the tariff Offices constitute a gigantic monopoly which arbitrarily raises rates—it never gets credit for *reducing* them—without considering its policy-holders. The existence of non-tariff rivals, and the fact that it is not in the interests of Insurance Offices to impose such prohibitive charges as to lessen their receipts, effectually check any such tendency. Is it not far better for the public that premiums should be adjusted on the basis of a wide collective experience than that they should be based on the perhaps imperfect data at the disposal of any individual Office which might lead either to unnecessary high charges or to the acceptance of business at such low rates as to imperil its financial stability? The fixing of a minimum schedule of rates for certain classes of business is, however, but one of many functions which the tariff organisation fulfils. Individuals are too prone to be actuated by prejudices or impulses, but the combined opinion of forty Offices (the number at present constituting the British tariff organisation, so far as direct business is concerned) has a steadying effect of which the insuring public unconsciously reap the benefit. That tariffs and tariff legislation have their imperfections, particularly as regards a certain lack of discrimination, is true in substance and in fact, but, even admitting these imperfections, the question naturally arises, Would the public be better served if the existing tariff organisation were dissolved? This is a question which it would be wellnigh impossible to answer in the affirmative.

When one remembers how much the tariff Offices have done to subdue the power of the fire-fiend by offering inducements to risk-improvement, and how little revolutionary legislation has emanated from their non-tariff rivals, it is all the more pleasing to thankfully concede to the latter the credit of having been the first to encourage the adoption of fire-extinguishing appliances, and more especially of automatic sprinklers, the unquestionable merits of which are now generally admitted. Of course, like everything else in this world, even automatic sprinklers occasionally prove to be a delusion and a snare, but if they are erected in accordance with a rigid application of stringent rules, and kept up to the mark by periodical conscientious inspection, they are the most effective sleepless watchmen

a manufacturer could desire. Inasmuch, however, as they are not infallible they can only be prudently regarded as ancillary to, rather than as superseding the necessity of, a Fire Insurance policy.

The ever-increasing congestion in the business portion of our large towns and cities is plainly adding to the conflagration hazard. This ever-present danger may in some degree be lessened by the external equipment of buildings with open sprinklers or "drenchers," while the circumspect underwriter will take steps to protect himself by a practical application of the doctrine of limitation of liabilities.

Just as the fire underwriter bases the calculation of the premiums to be collected from his policy-holders on the doctrine of distribution, so he applies the same doctrine to eliminate, as far as possible, from his own transactions any suggestion of chance, and to convert what would otherwise be a reckless gamble into a defensible system. He must of necessity expose himself to the possibility of greater or less aggregate loss from a number of individual fires, which to some extent skill in the selection of risks may keep within reasonable bounds over an average of years. What he can and should do is to see that his fire loss ratio is not exposed to excessive fluctuations by taking effectual precautions to ensure that his Company will not be liable to lose more than a restricted amount in consequence of any single fire. Having done so he can view matters with equanimity, knowing full well that if his statistics of fire mortality be accurate the law of averages will eventually operate in a corrective manner. Putting too many eggs into one basket tends to momentary economic embarrassment if the basket should upset. Shakespeare exemplifies the idea in the "Merchant of Venice," where he puts these words into the mouth of Antonio :—

"My ventures are not in one bottom trusted,
Nor to one place ; nor is my whole estate
Upon the fortune of this present year."

In former days this desirable end was attained by limiting the amount of the Company's acceptance on any one risk. This was one of the innovations introduced by "The Company of London Insurers"—now better known as the "Sun"—which in 1710 advertised, "No policy to be issued for more than £500." Presumably the rule of one risk one policy also obtained. As time went on, however, a system of facultative reinsurance was

introduced, a system by which the Offices distributed among themselves such amounts as they considered excessive. This system, which as a matter of expediency was run on reciprocal lines, had much to commend it, if one can forget for the moment a certain amount of moral flection or want of frankness with the public. It enabled the Offices, while restricting the amounts of their individual commitments, to spread these liabilities over a wider area. Under this system the difference between the commission paid to its agent by the ceding Office and that received by it from the guaranteeing Office—a difference for which the reason is not so obvious as might at first sight appear—was not sufficiently great in the long run to injure either party. Facultative reinsurance, however, is rapidly being consigned to the limbo of history, ousted by the "treaty system," under which there is no reciprocity. Surplus lines vanish to the Continent, and the old interchange of business as between Office and Office ceases. The insuring Office, it is true, attains its end by limiting its liability on the individual risk, but it minimises the opportunities, not only of itself but of its business rivals, of securing that plurality of separate risks which is of paramount importance to successful underwriting.

To carry this doctrine of the limitation of liabilities into practical effect presupposes some method by which the underwriter may decide how much he will retain and how much he will reinsure. Every underwriter knows that his limit on this or that class of risk is so much, and he will, no doubt, explain that this represents the maximum loss to which he is willing to expose his Company from a single fire; but press him still further and it will probably be found that the scientific basis upon which he estimates this maximum loss has a very nebulous or uncertain existence, or no existence at all. Indeed, it is to be feared that the whole question of limits is too often taken for granted, not from any lack of inclination to grapple with the complexities of the subject, but from an imperfect understanding of its intricacies. So much so that it would be difficult to select any Fire Insurance topic upon which the voice of one in authority would be listened to with greater attention than an attempt to elucidate the mysteries of this thorny subject. There are many people who, after pondering over the existing system of differential limits, have begun to doubt whether the original method of a fixed maximum, irrespective of the hazard involved, was not after all the right one to adopt. They argue that, if rates be

correctly made, 5s. risks are twice as hazardous as 2s. 6d. ones, for the rate should measure every consideration—construction, environment or exposure, occupancy and susceptibility to damage indicating the probabilities of salvage—but, on the other hand, a loss in one of the former would be recouped twice as rapidly as in one of the latter. They therefore hold that to introduce the element of personal opinion as to the probable extent of the damage, is unsound in theory, but that a Company's retention should be uniform, no matter whether the risk be a hazardous or a non-hazardous one, whether its contents be jute or pig-iron. So far their argument is a plausible one, but as to the method of deciding what that uniform retention should be they are silent.

No one in recent years has done more to advance our knowledge of the scientific side of fire underwriting than Mr. F. C. Moore, whose invaluable book, "Fire Insurance and How to Build," has already been quoted from in this essay, and he is one of the few writers who have attempted to deal with this subject in anything like an exhaustive manner. Mr. Moore's views, as will be seen from the following paragraphs, are diametrically opposed to those of the advocates of uniform retentions:—

"The amount which should be written on any risk should vary, of course, according to the hazard and according to the probabilities of totality or salvage in losses."

"An underwriter's line in a particular warehouse, for example, would be said to be full, not when he has secured \$5000 or \$10,000 of insurance, but when he has secured his premium, graded according to the classes covered, no matter what the amount of the insurance may be. If the rates are properly graded, his line would not be full if he had \$5000 on a 50-cent class, and would be more than full if he had \$12,000 on a 1 per cent. class. His loss on a \$20,000 policy on crude rubber would not be greater than on a \$5000 stock of toys. *It is, therefore, the probable amount of loss, and not the actual amount of insurance, which determines what a line should be.*"

"He should write less on risks which are peculiarly liable to take fire, peculiarly liable to be consumed before extinction and peculiarly susceptible to water or smoke damage than on subjects of insurance which are not liable to take fire, are easily extinguished and are not subject to water or smoke damage."

Having expounded his views as to the theory of limits generally,

he proceeds to formulate a system for ascertaining what limits should be:—

“If, for example, the Company’s average premium should be \$50 (throwing out of the account the small, so-called “chicken-feed” business of small dwellings, &c., which are annually assumed) it would be safe to write \$10,000 on a 50-cent risk (the rate being accurately computed) or \$5000 on a 1 per cent. risk. Let us suppose that there are ten classes of hazards of which there are only 100 specimens of each in the country, and that they range in proper rate from 25 cents up. Insurance on them would be theoretically adjusted as per the following Table:—

No. Risks.	Rate.	Line.	Total Premium.
100	·25	\$20,000	\$5,000
100	·50	10,000	5,000
100	1%	5,000	5,000
100	2%	2,500	5,000
100	4%	1,250	5,000
100	5%	1,000	5,000
100	6%	833	5,000
100	7%	714	5,000
100	8%	625	5,000
100	10%	500	5,000
<u>1000</u>			<u>\$50,000</u>

“Of course, the example would be more forceful and the tabulation safer if the number of risks were 10,000 instead of 1000; and, of course, while this proposition is scientifically true from the viewpoint of arithmetical computation and the law of average, it would not be in actual practice necessary to lay such strict limitations upon acceptances; for no great risk would be run, for example, by taking \$2500 lines on the 10 per cent. hazards, because the burning of a few of them would not be a serious matter and might meet the conveniences of the business; while, on the other hand, it might not be advisable to accept \$20,000 on 25-cent risks.”

“It is, probably, unnecessary to add that it would be perfectly safe to take a large number, say 10,000, of 10 per cent. hazards for a full line of \$10,000, since there would then be enough of the class to make the average line, though large, a safe one. My contention simply being that where there is not enough individuals of any one hazard to make a safe class by itself, it being necessary

by reason of the small number of such class to rely on the general average of others, the line on the more dangerous classes must be graded to equalise the proper proportion of losses on all classes."

As to the relation of a Company's premium income to its limits Mr. Moore's remarks are worthy of some consideration :—

"The statement is frequently heard that a Company having a large premium income of, say, four million dollars can afford to take larger lines than when it had an income of one million. This is approximately true within certain limitations. Theoretically, it is untrue in every respect; for if the premium income of four million dollars is made up of a large number of non-hazardous risks there will be no margin with which to pay an exceptional loss on a risk of high ignitibility. If the rates have been graded properly, all of the four millions will be needed to pay the \$2,200,000 (or 55 per cent.) of losses inevitably due to the hazard of carrying the four millions of risks, and the excess losses will have to be paid, not out of premiums, but out of what would have been and ought to have been profit."

In short, Mr. Moore's views are so interesting that it is difficult to resist the temptation to quote *in extenso* the whole of the seven pages devoted to this fascinating subject.

At one time it was considered that any surplus, after payment of losses and working expenses, was profit, and it is only of comparatively recent years that it has been realised that this would only be true if the liability arising out of the acceptance of premiums had expired. A premium, until earned, represents a liability, not an asset. Till a Company has fulfilled its obligation (1) by running off the full term of its contract, (2) by payment of the sum insured, or (3) by returning to the insured a proportionate part of the premium corresponding with the unexpired term of the insurance, it has still an unexhausted liability. A Company may close its books on the 31st December, but as the expiry of very few of its policies coincides with the date of the annual balance, there must obviously be an unexhausted liability at that date. In the case of a wealthy Company, whose premium income does not vary from year to year, the amount of unexpired risk at the end of one year neutralises the unexpired risk of the preceding year. Under such very exceptional circumstances many people hold that to make any allowance is quite unnecessary. To some extent it is so, and the lack of a reserve for unexpired liability would only be felt in the event of the Company's

discontinuing to do business. Where, however, one has to deal with a fluctuating premium income the necessity for such a reserve is more apparent. As to its precise nature there are diverse opinions. A common practice in this country is to carry forward 40 per cent. of the premium income after deduction of reinsurances, but this system appears to have a weakness. Out of a premium income of, say, £10,000, £4000 would be carried forward; but as agency commission and managerial expenses must be paid out of that £10,000 practically as soon as, if not before, it was obtained, the nett income would only represent about £7000. Now, that would seem to indicate that in the first period, representing 60 per cent., a Company must run off its losses on an income of £3000, while in the second, representing 40 per cent., it has £4000 on which to do so. Another system, which has many advocates, requires that the reserve should be a sum which will enable the Companies to discharge their loss liabilities. The reserve is therefore based, not upon the gross premium, as at present, but upon the nett premium after deducting expenses, the percentage being calculated upon that portion of the premium which is designed for paying losses, and not upon the whole which includes a loading for expenses. Such a system would prove adequate, or the reverse, according to the sufficiency of the rates obtained. Yet, again, it is urged that what should be reserved is a sum sufficient to induce another Company to take over all current liabilities. Then Mr. Moore enunciates the theory that the reserve for unexpired risk of a Company should represent the exact sum required to pay to the holders of its policies the *pro rata* unearned premium for their unexpired terms, and thus relieve the Company of all further liability. It will thus be seen, that the chief stumbling-block in the way is the want of a definite objective, or rather a diversity of opinion upon the point. In all attempts to settle the question it should be borne in mind that the reserve for unexpired risk is usually, if not invariably, supplementary to the ordinary system of reserves. Meanwhile the subject is attracting the attention of some of the ablest brains on both sides of the Atlantic, but when experts differ who shall interfere?

So far as this country is concerned, Fire Insurance business is singularly free from restrictions such as are imposed by the "grandmotherly legislation" of some other countries. Half a century ago there was a duty of three shillings on every

hundred pounds on property in the United Kingdom, with the sole exception of agricultural produce. As time went on, however, the impost was reduced to 1s. 6d. per cent., until eventually, when it was realised that any restrictive legislative measures, whether in the form of taxation or otherwise, are prejudicial to the public interests, the stamp duty was reduced to a nominal penny on each policy. This is a matter for distinct congratulation, because naturally all taxation, with the cost of the collection of it, was included in the premium, so that the burden fell on the shoulders of the provident public. Fire Insurance, when all things are considered, is little less than a tax which the community pays annually as a result of the careless handling of fire, so that to tax a tax was manifestly unfair. Similarly, with regard to the maintenance of fire brigades, public recognition of the injustice of attempting to foist the cost of their upkeep on the Insurance Companies has made little headway, although it must be confessed that ignorance of the economics of Fire Insurance has prevented any retrocession. There is a great difference of opinion as to the expediency, as opposed to the necessity, of Insurance Offices contributing towards extinguishing expenses, or even of making concessions in the way of discounts for fire-extinguishing appliances, but so long as competition is as keen as it is, it is to be feared that that difference of opinion will continue to exist.

Such, then, are some of the salient features of the theory and practice of Fire Insurance business. Those who are best qualified to express an opinion unanimously agree that the Fire Insurance Offices serve the public faithfully and well. Without them commerce could not continue on its present lines. Enterprises representing the outgrowth of years of strenuous labour would, like Damocles, find the sword of destruction ever overshadowing them, but insurance, by promising reinstatement of loss, practically removes the incubus, and furnishes that guarantee which is the foundation of credit. In the vocabulary of the fire underwriter there is no such word as finality, and it is a magnificent tribute to the efficiency of the system of Fire Insurance that it has kept pace with the marvellous evolutions of science and industry. When men first guided the infant footsteps of the oldest of our existing Offices along the world's highway things were not what they now are. No steam engine lent its powerful aid to the efforts of man, the iron trade was almost unknown, the cotton trade was yet unborn,

and thousands of factors of our latter-day existence were wholly undreamt of. Yet age has not brought unadaptability, nor prosperity lack of enterprise. Truly it may be said that Fire Insurance business is "a mighty maze, but not without a plan."

EXAMINATION PAPERS—1904.

FIRE BRANCH.

PART I., SUBJECT A.—POLICY DRAFTING AND ENDORSEMENTS.

(BOOT AND SHOE TARIFF.)

(Two hours allowed for this Paper.)

The use of the Tariff is permitted. Printed Warranties and Scale of Allowances must be used and attached to the Draft.

Messrs. WILLIAMS & Co., of Green Street, NORTHAMPTON,
Boot and Shoe Manufacturers.

No. on
Plan.

1. Boot and Shoe Factory, 5 storeys in height, situate as aforesaid, heated by exhaust steam from boiler and as afterwards stated.
 - 1st Floor.—Press Room and Rough Leather Store, having timber partitions to the ceiling, which is of wood.
 - 2nd Floor.—Clicking and Rivetting Rooms.
 - 3rd Floor.—Finishing Rooms; a little cement containing rubber solution used (the cement is kept in a small iron Drum with iron lid).
 - 4th Floor.—Sewing Rooms, a pipe stove on stone with $3\frac{1}{2}$ feet of pipe venting into brick chimney for warmth. Shoemakers' wax is warmed by gas jets having metal shields, the whole apparatus standing on an incombustible base having a $1\frac{1}{2}$ -inch metal rim round.
 - 5th Floor.—Stock Room, part for drying by exhaust steam pipes, wood staircases from floor to floor, and an internal hoist. 102 hands employed.
2. One-storey Engine and Boiler House adjoining No. 1 and communicating therewith by double fireproof doors. There is also a small window 3 feet square looking into the 1st floor of No. 1. A 12 H.P. Steam Engine and Boilers therein securely fixed. No drying done.

3. One storey. Part Rivetting Shop and part timber partitioned off as Sewing Room, situate 20 yards from Nos. 1 and 2, heated by low-pressure steam from the boilers. A small 5 H.P. Steam Engine therein securely fixed for working machines. No wood linings. 47 hands employed therein.
4. One storey. Part timber partitioned off as Office, having wood linings to ceiling and walls, heated by two gas stoves, part as Warehouse, adjoining but not communicating with No. 3 on Plan. A pipe stove with 2 feet of pipe allowed for warmth. 16 hands employed.

All the aforesaid buildings are in the sole occupation of the insured, brick or stone-built and slated or tiled, and lighted throughout by incandescent gas lights.

FIRE APPLIANCES.—The requisite number of buckets and chemical extinguishers in each building as per Tariff scale.

Insurance in other Offices allowed, etc.

From 29th September, 1903, to 29th September, 1904.

	No. 1.	No. 2.	No. 3.	No. 4.
Building,	£3,000	£200	£800	£450
Machinery and Gearing,	4,250	—	1,400	—
Stock in Trade,	2,800	—	775	2,200
Steam, Gas, and Water Pipes, . .	100	—	50	—
Steam Engine,	—	220	150	—
Steam Boilers,	—	200	—	—
Trade and Office Furniture, . .	20	—	—	50
Total,	<u>£16,665.</u>			

Draft a policy (showing rates in detail) and calculate the Annual Premium.

ENDORSEMENT.

On the 25th December, 1903, the Firm advise the Office that the pipe stove on the 4th floor of No. 1 on Plan has been removed and a small gas stove has been substituted. They further state that the number of hands in this building has been increased to 160, and that the window in the Engine and Boiler House looking into 1st floor of No. 1 on Plan has been bricked up.

Draft endorsement showing future Annual Premium.

FIRE BRANCH.

PART I., SUBJECT A.—POLICY DRAFTING AND
ENDORSEMENTS.

(CLOTHING FACTORIES.)

*(One hour and a half allowed for this Paper.)**The use of the Tariff is permitted. Printed Warranties must
be used and attached to the Draft.*

Prepare Policy and work out Premium for the following:—

BROWN, JONES, SON & Co., LTD., Eagle Works, BRISTOL,
Wholesale Clothiers.

No. on Plan.	Height.	Rate.			REFERENCE.
1	5 storeys.	Normal, Linings,	2/6 6d.	3/-	Fireproof except roof. 1st.—Warehouse (wood-lined) and cutting out (no power) entrance, office, lodge, gate- way, and Cuttings store, and part contains firing place to low-pressure hot-water appa- ratus having two feet of smoke pipe.
		Normal, Partition, Kiln,	2/6 6d. 1/-	4/-	2nd.—(Wood-lined) Tailors' workroom, two brick-built kilns for heating irons.
				2/6	3rd.—Cutting-out room, two band saws.
		Normal, Kilns, Partition,	2/6 1/- 6d.	4/-	4th.—(Divided into several rooms by timber partitions) Tailors' workroom (no power), pressing, giving-out rooms and sundries store. Two fire-heated ovens for heating irons, one gas-heated presser, and one gas cooking stove.
		Normal, Height, Ovens, Linings,	2/6 6d. 1/- 6d.	4/6	5th.—Tailors' workroom and mechanics' shop (divided by wood partitions), two fire- heated iron ovens, less than three feet of pipe and one gas-heated presser.
					N.B.—Not more than 100 hands employed in any one of the above storeys.

No. on Plan.	Height.	Rate.			REFERENCE.
2	3 storeys.	Normal, Partition,	4/- 1/-	5/-	1st. — Tailors' workroom, Cutting-out room containing two band saws, and part foreman's office. 2nd. — (Divided into several rooms by timber and glass partitions) Cutting-out room, pressing room, (eight gas-heated box-irons here), tailors' workroom and despatch room. 3rd. — Warehouse and office. N.B.—About 170 hands employed in this building.

All brick-built and slated, worked by gas power, the engine being in a detached building, lighted by incandescent electric light (approved), in sole tenure of insured.

All clippings removed at least once a week. No waterproof garments made or bi-sulphide of carbon used.

No fire appliances.

AMOUNTS.

No. on Plan.		Building, &c.	Machinery, &c.	Stock, &c.
		£	£	£
No. 1.	1st Storey, .	300	500	3,000
	2nd „ .	300	2,000	1,000
	3rd „ .	300	500	1,500
	4th „ .	300	2,500	1,000
	5th „ .	300	1,000	500
No. 2	. . . . .	1,000	2,500	3,000

Policy to date from 20th September, 1903, to Michaelmas, 1904.

ENDORSEMENT.

Prepare an endorsement transferring £1500 on stock from No. 2 to the 1st Storey of No. 1, and increasing the number of hands in No. 2 to under 300, also allow a timber staircase between the 2nd and 3rd storeys of No. 2, all as from the 1st January, 1904.

FIRE BRANCH.

PART I., SUBJECT B.—RE-INSURANCES.

(One hour and a half allowed for this Paper.)

QUESTIONS.

1. Define the following terms: (a) Take-Note, (b) Guarantee Proposal, (c) "Head Office" of a Foreign Company.

2. Distinguish between the acceptance of a Guarantee Proposal and the issue of the Guarantee Policy.

To what extent are Acceptances held as binding when given (a) from a Head Office, (b) by a Branch Official?

3. In order to secure continuance of protection, what precaution must be observed by an Insuring Office regarding the Renewal of a Guarantee after a Short-Term Policy?

4. State fully the rule as to the date at which liability begins on the part of an Office which accepts a Guarantee Proposal.

5. What is meant by Sub-Guarantee, and what is the condition of validity of a Sub-Guarantee?

6. In issuing a request for a Guarantee, what information must be supplied?

7. How are the Insuring Office and the Guaranteeing Office respectively protected should error occur in giving the information referred to in Question 6?

8. At what time does protection to an Insuring Office begin in the case of an Acceptance given by a Branch Official? What exception is there to this?

9. What condition must be observed in the form of issue of a Guarantee Policy? What is the usual form, and when is it allowable to depart from this?

10. What transaction takes place between the Acceptance of a Guarantee Proposal and the issue of the Guarantee Policy? Indicate briefly the regulations framed to cover this transaction.

11. How do special conditions in a Take-Note affect interim protection?

12. What would you understand by the words "Subject to approval" inserted in a Guarantee Acceptance given by a Branch Official?

FIRE BRANCH.

PART I., SUBJECT C.—GENERAL RULES FOR THE REGULATION OF FIRE INSURANCE BUSINESS.

(Two hours allowed for this Paper.)

QUESTIONS.

1. What is the rule as to covering loss or damage occasioned by "Riot or Civil Commotion," and what is the exemption, if any?

2. (a) In what circumstances is it permissible to grant an Annual Policy for an initial period of less than 12 months at a *pro rata* proportion of the Annual Premium?

(b) To what classes of Property does such permission alone extend?

(c) What are the Conditions which must be complied with to entitle Insured to this privilege?

(d) What property is specifically excluded from such privilege?

3. Where the Insurance on a building is required to be made "subject to average," can any, and if so what, part of such building be exempted?

4. What action is required on the part of an Office infringing a 'Tariff Rate or Regulation, upon such an infringement being brought to its notice?

5. What are the conditions under which additional Rates under the following heads are chargeable?—

(a) Defective Construction.

(b) Heating.

(c) Night Work.

(d) Electric Motor.

(e) Tenants.

6. Under what conditions may the range of Insurances on Merchandise in Carriers' Warehouses under Carriers' Floating Policies be extended?

7. What Oils are expressly included in Insurances on Merchandise on Carriers' Premises?

8. (a) What are the distinctive names of various average clauses?

(b) Under what circumstances has each to be applied?

9. In what cases may a building consisting of two floors over whole or part of its area be rated as a "Shed"?

10. What is the usual Scale of Rates for Short Period Insurances?

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS

(BOOT AND SHOE).

(One hour and a half allowed for this Paper.)

QUESTIONS.

1. State the two broad classes of risks to which this Tariff applies.

2. A one-storey factory (A), rated at 5/-, communicates openly with a five-storey warehouse (B), rated at 5/6. How should A and B be rated?

3. Give the Tariff definition of what may be extra rated as "floor openings." What are the extras for:

Warehouses?

Factories?

4. Rate the following factory. Five storeys in height, brick and stone-built and slated (except brick-built and felt-roofed one-storey extension communicating), gas engine on ground floor, enclosed in wood partition from floor to ceiling; 230 hands employed.

5. What are the various Tariff Rates for the use of rubber solution, stixole, and cement, and what are the varying conditions under which such differential rating operates?

6. What extra is chargeable for drying in warehouses and factories?

7. If a factory employed 500 hands, and its rate otherwise came out at 8/6, what should the total rate be, and what is your method of arriving at it?

8. Give the normal rates of fireproof factories.

9. What substances are specially excluded from the term "other fastening material"?

10. State the discount allowed under this Tariff for extinguishing appliances.

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS

(CLOTHING FACTORIES).

(One hour and a half allowed for this Paper.)

QUESTIONS.

1. State the rule as to rating of adjoining buildings under this Tariff.

2. What is the minimum rate for any risk which is included in any premises comprised under the heading of this Tariff and not otherwise ratable thereunder?

3. What Insurances under this Tariff are to be subject to average?

4. What is the allowance for approved automatic sprinkler installation and upon what is it conditional?

5. "Hands." (a) State the rule for computing the number of "hands."

(b) What number of "hands" is allowed without extra?

(c) What are the extra charges when the "hands" exceed the number referred to in (b)?

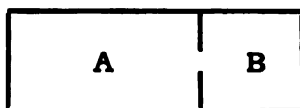
(d) What is the maximum extra charge under this head?

6. Under what item of the Specification are patterns insured?
 7. What is the regulation as to cloth clippings and/or cuttings?
 Quote the extra charges and write out the Warranties.

8. What are the extra charges for—

- (a) Gas Engine in a non-fireproof compartment within the building.
- (b) Boiler for working a steam engine in a non-fireproof compartment within the building.
- (c) Gas Engine in a fireproof compartment within the building, communicating by ordinary door with the building.

9. Rate the risks described below. Except as otherwise mentioned, the risk conforms to the normal.



A. 4 Storeys with basement under part. *Basement* (having ceiling 4 ft. above ground level): store for empties. *Ground floor*: Offices and contains cutting-out machinery, also a gas engine in timber and glass compartment (timber partitions not exceeding 5 ft.) for working said cutting-out machines and sewing machines in floors above. Communicating with the fireproof ground floor of **B.** *Upper floors*: Sewing machine rooms and for finishing and pressing. A fire-heated oven for irons on concrete with 2 ft. of pipe carried into brick chimney. Staircase from floor to floor within the rooms.

B. 2 Storeys, 1st fireproof: Warehouse for cloth, trimmings, and finished stock; wood-lined throughout. 2nd Fireproof, entered from outside only: Clothing Factory, containing 3-h.p. gas engine for working the machinery and office and stock room. Irons heated by gas circles standing on stone and connected by iron pipes. No communication with **A** on this floor.

Buildings brick-built and slated. **A** and 1st of **B** in tenure of Brown, 2nd of **B** in tenure of Tomson. 180 hands employed by Brown in **A**, and 30 in 1st of **B**: 40 by Tomson in 2nd of **B**.

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS

(SPRINKLERED CORN MILLS).

(Two hours allowed for this Paper.)

QUESTIONS.

1. State what extras are provided in this Tariff for communications (a) by single fireproof doors and (b) by double fireproof doors.

2. "Electro motors, 10/-."—What does this mean?

3. A miller writes: "Please let me know what would be required in order that I may secure the most favourable terms for lighting my mill by gas and by electric light respectively. I shall be glad to know, generally, any points in connection with lighting." Reply.

4. What is a sprinklered corn mill as defined by the Tariff?

5. State the detail of rate of the following: A mill of six storeys in height containing 4 pairs of stones and 570 inches of roller contact, 1 Bamford's patent rapid corn grinding mill, 2 vertical grain brushing machines (the feed spouts not protected by magnets). All the dust receptacles are within the mill.

6. Owing to the sprinkler installation not being in all respects conformable to the rules, a reduced discount of 25 per cent. had been fixed. Assuming the rate for the mill, under the present tariff, to be 17s. 6d. per cent., what rate would you now quote for the risk?

7. What is the rate for a non-sprinklered smut house, distant from the mill 26 feet?

8. What are the features in dust receptacles in a mill which secure for them immunity from charge?

9. What arrangements are necessary in order to secure the lowest possible charge for a non-fireproof grain warehouse adjoining a sprinklered corn mill?

10. A mill of 7 storeys (rollers only) contains 800 inches of roller contact; the boiler outside the mill but communicating; the dust receptacles from rollers are inside the mill. The rate is known to be 16s. 6d. per cent. How may the discrepancy be accounted for by some one other feature not mentioned above? Mention any possible alternatives.

FIRE BRANCH.

PART II., SUBJECT B.—MANUFACTURES

(BOOTS AND SHOES).

(Two hours allowed for this Paper.)

QUESTIONS.

1. Give in their order the names of the principal processes gone through in the manufacture of the finished boot, describing in a few words each of the processes named, excluding "lasting" and "finishing."

2. Name the various parts included in "bottom stuff."

3. Describe briefly the process of "lasting of uppers."

4. Name the four principal leathers used in the manufacture of boots.

5. What are (a) ranges, (b) lifts, (c) stiffeners?

6. (a) Why is a heated wax-pot attached to certain machines?
- (b) Name the best known machine containing such wax-pot.
7. What are (a) dubbin, (b) shoemakers' wax made of?
8. Name (a) the separate departments into which an *ordinary* boot and shoe factory would probably be divided and (b) the additional departments which a large factory might contain.
9. Name five of the chief centres of the boot and shoe manufacture, giving the particular branch of the trade which each devotes itself to.

FIRE BRANCH.

PART II., SUBJECT B.—MANUFACTURES

(FLOUR).

(Two hours allowed for this Paper.)

QUESTIONS.

1. What are the most satisfactory wheat-growing districts, and why?
2. To get the best yield from wheat, what storage conditions must be observed?
3. What are the following : germ, meal, randan, and sharps?
4. Contrast by brief description the old system of grinding by stones with the development of the new roller system.
5. What sphere of usefulness is the plansifter calculated to occupy in modern milling?
6. What are the advantages claimed for the vertical smutter?
7. What are the merits of the "cyclone" dust collector?
8. Annotate upon the several kinds of purifiers known to you.
9. Distinguish between elevators and conveyors.
10. What are the differences in the construction of old and modern mills, both as regards fireproof and non-fireproof structures?

FIRE BRANCH.

PART II., SUBJECT D.—CORRESPONDENCE.

(Two hours allowed for this Paper.)

QUESTIONS.

1. On making an official inspection of a Warehouse, the building of which is insured by your Company, it is found that the firm have erected a complete party wall in the centre of the building, so as to divide the risk into two separate sections, but have omitted to intimate the change to the Office. Write to Insured stating what is required in the circumstances, and how the policy will be affected in event of their failing to comply with your request.

2. An Insured having Works ratable under the "Boot and Shoe Tariff" writes that he has installed several Fire Hydrants in his open yard, with a sufficient quantity of hose and water available at such a pressure as to command the whole premises insured, in respect of which he claims a discount off his premium. Reply stating what discount may be allowed on the factory (subject to the appliances being found in order on inspection) and whether the same discount may be extended to his Warehouses which form separate risks at the same works.

3. Your Office has held a risk insured for three months under covering note pending adjustment of amounts, and at the expiry of that time the Agent intimates that another connection of the firm has influenced the transfer of the business to a rival Company. Write appropriately withdrawing cover and stating what proportion of annual premium is payable.

4. An influential Agent submits a proposal for £2000 on a Drapery Warehouse of substantial construction, but on making survey you find that two windows in the rear wall overlook the roof of a timber-built joiners' workshop and the Warehouse contains two stoves for warmth which are in too close proximity to wood lining. Reply, explaining what should be done before accepting the proposal.

5. An Agent forwards a claim for damage to a Mirror which has been cracked by heat from a gas-jet in close proximity. Write advising the position of the Company with regard to such a claim.

6. A Wholesale Warehouseman holding a policy over his Stock-in-Trade is removing to another warehouse. The process of removal will be gradual, and he forwards his policy desiring that it be endorsed holding his stock covered in both buildings. Write explaining what conditions will apply to the insurance during removal and how it will be affected in event of loss if the whole property at risk be covered for less than its actual value.

7. An excellent Agent urges the issue of a valued policy on several costly Pictures belonging to an influential client, who is willing to pay the fee of a first-class expert, to be mutually chosen with a view to establish value prior to the insurance being effected. Reply.

FIRE BRANCH.

PART II., SUBJECT E.—PLAN DRAWING.

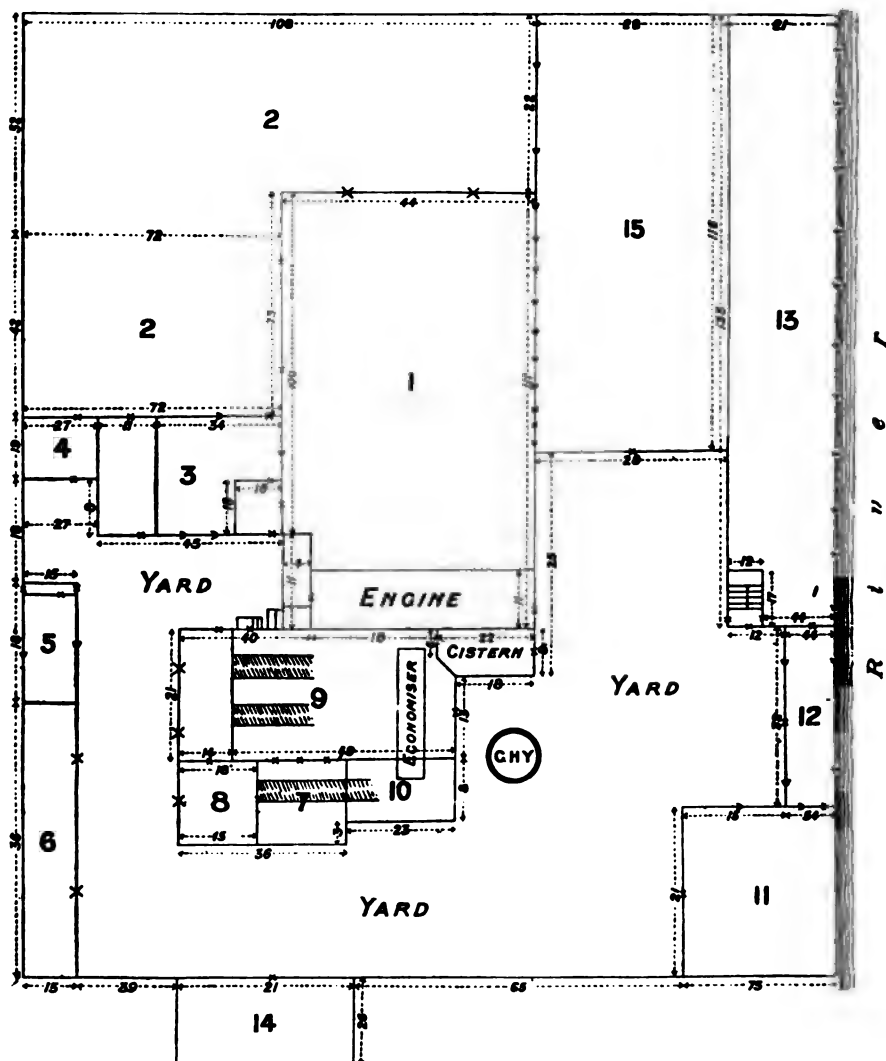
(Two hours allowed for this Paper.)

INSTRUCTIONS.

Draw to a scale of 40 feet to one inch. No. 1 to be laid down first.

PERSEVERANCE MILLS, ADDINGHAM, YORKSHIRE.

ROBERT BEAUMONT & SONS,
WOOLLEN CLOTH MANUFACTURERS, OWNERS AND OCCUPIERS.



The measurements thus <.....45.....> denote feet.

Buildings all of stone or brick, unless otherwise described. All party walls pass through roofs, except as otherwise described.

Doorways and openings are indicated thus—

. — x — x — X — .

Windows are indicated thus — w — w — w — w — w —

1. Three-storey mill. Communicates with 2 and 15. A wood gangway from 2nd and 3rd storeys to corresponding storeys of staircase to 13. A steam engine in non-fireproof compartment as shown on plan.

2. Shed, having skylights only. Communicates 1 and 3 and (by double metal-covered doors) with 4.

3. Three-storey warehouse. Communicates 1 and 2. A timber partition divides (a) and (b) on 1st storey only. The stone-built staircase common to 1 and 3 contains a hoist well.

4. Two-storey offices. Communicates 2 by double metal-covered doors.

5. One storey. Workpeoples' entrance and timekeeper's office; under same roof as 6.

6. One storey. Cart and waggon shed; partially open to yard.

7. Two storeys. Boiler house with stove over; contains horizontal boiler which extends into 10; boiler, 5 feet x 30 feet; communicates freely with 9.

8. One storey. Coal and firing place; communicates 9.

9. Two storeys. Boiler house with stove over; communicates 7 and 8, and contains two horizontal boilers, each 6 feet x 30 feet, also economizer, 7 feet x 24 feet.

10. One storey. Extension of boiler house.

11. 12, and 15. One storey. Sheds with skylights; communicating as shown.

13. Three storeys. Mill; communicates 12.

14. Two storeys.

Chimney shaft is circular, 33 feet in circumference, and distant from 9 and 10 at nearest point 6 feet, and 6 feet from cistern.

PART III., SUBJECT A.—LAW OF FIRE INSURANCE AND FIRE INSURANCE CONTRACTS.

(Two hours and a half allowed for this Paper.)

QUESTIONS.

1. Explain the leading principles of the contract of fire insurance.

2. Enumerate shortly the usual printed conditions in the policy.

3. Where the written part of the policy is inconsistent with the printed conditions, which would prevail in determining the contract?

4. Under what conditions can a policy be assigned from one party to another?

5. How is the sum insured affected by a loss happening during the currency of the policy?

6. State generally the rights of the insurer to deal with the salvage arising from fire.

7. In the case of sale and purchase of buildings, in whom is the insurable interest vested pending payment of the price?

8. What constitutes the insurable interest of tenants in rents, and of an hotel-keeper on the goods of his guests?

9. Give other examples of insurable interest.

10. It is known that insured property has been damaged by sparks from a passing locomotive or traction engine. On a claim being made, what is the method of procedure in effecting settlement of the claim?

11. Name the statute law under which a tenant can compel the insurance company to expend the policy moneys in reinstatement of the building, in case the owner refuses to do so.

12. Under what circumstances are consequential damages paid for.

FIRE BRANCH.

PART III., SECTION B.—AVERAGE CLAUSES AND LOSS APPORTIONMENTS.

(Three hours allowed for this Paper.)

QUESTIONS.

1. Explain the meaning of the word "ratable" in the Contribution Clause where Average Policies are concurrent.

2. Define the effect of each of the two Conditions of Average.

3. A merchant has four warehouses with stocks therein, and takes out policies as follows:—

STOCKS.			POLICES.		
A	...	£2,000			£3,000
B	...	1,500			2,000
C	...	500			1,000
D	...	6,000			1,000
Floater over all			...	...	5,000
<u>£10,000</u>			<u>£12,000</u>		

All the warehouses are destroyed. Show how the Floating Policy would operate in adjusting a total loss on each warehouse.

4. Apportion the following under the First Condition of Average:—

Insurance	...	...	...	£12,000
Value	...	...	...	15,250
Loss	...	...	...	6,250

Fractions of a Pound may be discarded.

5. Apportion the following non-concurrent Policies, subject to the First Condition of Average only:—

Policy No. 1 ...	£3,000 on A and B.	Values ...	£5,000 in A
" " 2 ...	7,000 on A and C.		5,000 in B
" " 3 ...	2,500 on A, B, and C.		2,500 in C
	<u>£12,500</u>		<u>£12,500</u>
	<u>Loss in A, £5,000.</u>		

6. Apportion the following:—

VALUE.		SPECIFIC INSURANCES.	
Warehouse A ...	£4,000	Pro Rata Condition of Average—A	£3,000
" B ...	2,000	Floater over A and B (Two Conditions of Average) ...	3,000
	<u>£6,000</u>		<u>£6,000</u>
	<u>Loss in A, £1,000.</u>		

Work out result in detail, and explain if this can be arrived at by any other method presently in use.

7. Apportion the following:—

VALUE.		SPECIFIC INSURANCES.	
A ...	£13,500	Pro Rata Condition of Average—A	£12,000
B ...	14,000	" " " B	14,000
C ...	20,000	" " " C	18,000
		Floating over A and C (Two Conditions of Average) ...	17,000
	<u>£47,500</u>		<u>£61,000</u>
Loss—A ...	£13,500		
B ...	140		
C ...	65		
	<u>£13,705</u>		

8. Apportion the following:—

VALUE.	Loss.	A—Average	...	£4,000
£10,000	£1,000	B—Specific	...	1,000
				<u>£5,000</u>

9. Policy A for £1000 insures goods in warehouse X.

" B for £1000 " " X and Y.

Loss occurs in Y, £1000. The value of goods in X and Y are £1000 and £3000 respectively. Show what is the liability of Policy B—both Policies being subject to the Two Conditions of Average.

10. Policy A covers stock and all movable utensils in Flax, Tow, and Linen Yarn Warehouse, subject to Average,	£1,500
Policy B covers stock of Flax in same warehouse, also subject to Average,	1,000
	<u>£2,500</u>

VALUE—Flax ...	£1,587	Loss—Flax ...	£1,276
Tow ...	218	Tow ...	174
		Utensils and Yarn ...	Nil
	<u>£1,805</u>		<u>£1,450</u>

Apportion the Loss—

1. By adopting independent liability.

2. By adopting the mean principle.

And explain the advantage to each office by these methods.

FIRE BRANCH.

PART III., SUBJECT: SPRINKLER INSTALLATIONS.

(Two hours and a half allowed for this Paper.)

QUESTIONS.

1. It is found necessary to place fire hydrants upon the supply pipe from the town's main to the main stop valve of an installation. Which side of the back pressure valve would you select for such hydrants, viz.:—the length of pipe between the street main and the back pressure valve, or the length between the back pressure valve and the main stop valve? Give your reasons for the preference.

2. A mill has only one steam boiler, the fire of which is known to be drawn for a week every year for cleaning and examining purposes. How would this limit the alternatives of possible water supplies?

3. Adjoining a sprinklered storied building is a shed constructed of brick with slated roof. There are no doorways between the mill and the shed, but there are several windows in the first storey of the mill looking into the shed. What further information would you require to enable you to say if it would be necessary for the shed to be sprinklered, assuming the premises to be occupied as

(a) Cotton Spinning and Manufacturing Mill,

(b) Corn Mill,

(c) Tannery?

4. In the distribution of sprinkler heads, what difference would it make if the ceiling of a room were underdrawn with plaster, wood, or metal, as against an open-joisted ceiling?

5. On an open-joisted ceiling giving bays six feet wide it is proposed as a more economical arrangement to run the distribution pipes across the bays instead of down the bays. The pipes would then rest at the base of the heavy ceiling beams, and be distant from the ceiling the depth of the beams. Would this arrangement be in accordance with the rules?

6. Name the accepted sources of water supply, and specify any conditions precedent to acceptance attaching to injectors.

7. With 135 sprinklers on a floor, give the size of town's main, and nature and capacity of pump required by the rules.

8. A firm of cotton spinners object to sprinkler a storied warehouse adjoining their storied sprinklered mill, and cut off therefrom by a party wall rising up to the roof which is common to both buildings. There are double iron doors to all openings between the two buildings. Give your reply.

9. A firm are considering the adoption of sprinklers. They possess a steam pump of adequate power, which they desire to utilise as one of the necessary water supplies. They offer in addition either a connection with an efficient town's main or a tank of regulation capacity. What further information would you require to enable you to accept the town's main as one of the supplies?

10. The supplies to an installation are tank and non-automatic pump. State how many pressure gauges would be necessary, and specify their position.

11. A main stop valve is secured open by a chain and padlock. Is this in order?

12. State the cases where subsidiary stop valves are permissible. Give any reasons that occur to you in explanation.

13. From the point of view of efficiency would you prefer a dry pipe installation where either wet or dry would be permissible? Give your reasons, and state under what circumstances a dry pipe installation is obligatory.

14. In a corn mill, the size of the largest room is 50 feet by 35 feet; state how many sprinkler heads would be necessary for this floor under the most favourable circumstances.

15. It is proposed to equip a cotton mill, six storeys high, with sprinklers. The height from ground floor to underside of roof ridge is 65 feet. There is a town's main in road with 35 lbs. minimum pressure. It is proposed to utilise this main as one of the supplies. Could this be accepted, assuming the diameter of the main to be in accordance with the rules?

FIRE BRANCH.

PART III., SUBJECT D.—ELECTRICITY.

(Three hours allowed for this Paper.)

QUESTIONS.

1. A three-storey house is wired for electric light on the distribution board system, there being one board on each floor. On the ground floor there are 29 lights, on the first floor 18, and on the second floor 13. The voltage of the supply is 200 volts.

Assuming that all the lamps are 60 Watt lamps, what current would flow, when all the lamps are alight, through the following wires?

(a) The main house service.

(b) The branch wires feeding the first floor.

2. An electricity supply voltage is changed from 100 volts to 200 volts. What precautions should be taken in a house which has been wired for a long time before you consider it safe to change over to the higher voltage?

3. State the necessary rules which shall be observed in the installation of

(a) Arc Lamps in a Draper's Shop,

(b) A Motor in a Flour Mill,

in order to minimise the fire risk.

4. Why is it dangerous to run electric light wires near a composite pipe carrying gas?

5. Describe briefly the essential points of the following fittings for satisfactory use on a 220-volt installation:—

(a) Lamp holders.

(b) Counter-weight pendants.

(c) Main double pole switch.

(d) Sub-circuit fuses.

(e) Ceiling roses.

6. What do you consider a safe insulation resistance for a 75-light 200-volt installation in a dwelling-house of good construction? What pressure should be employed to make the test for insulation? To what extent might you expect the state of the weather to effect your result, and what latitude should be allowed?

7. What is the chief reason for using a larger conductor to carry a larger current, and what is a fair load for a conductor to carry which has a cross section of $\frac{1}{4}$ square inch.

8. State the necessary precautions to be adopted in a building where telephones and electric light are installed, in order to minimise the fire risk?

9. What is an electrical short circuit, its danger from a fire-risk point of view, and the usual protective measures adopted in connection therewith?

10. A joint in a conductor is a source of danger. State why; and if a joint is unavoidable, describe a safe method of making one.

11. Give a brief outline of a satisfactory electric light and power installation for a Cabinet Works, dealing with—

(a) Engine Room.

(b) Main Circuits for Light and Power.

(c) Motors.

(d) Arc Lamps.

(e) Electric Glue Pots.

12. Give briefly the advantages and disadvantages of electric light as compared to gas from a fire point of view.

FIRE BRANCH.

PART III., SUBJECT E.—CHEMISTRY.

(Three hours allowed for this Paper.)

N.B.—Not more than Six Questions must be attempted; Three of these must be chosen from Nos. 5, 6, 7, 8, 11, and 12.

QUESTIONS.

1. How is ordinary nitric acid made? Explain fully, giving equations, the action of nitric acid on (a) sulphur, (b) tin, (c) copper, (d) iron, (e) ammonia, (f) hydrochloric acid, (g) hydrogen sulphide, (h) sodium bi-carbonate.

2. Describe the general action of the following reagents on organic compounds, giving examples:—Chlorine, hydrochloric acid, hydriodic acid, sulphuric acid, nitric acid, nitrous acid, caustic soda.

3. A litre of water (sp. gr.=1), in cooling down from a certain temperature to the point of maximum density, evolved 84,000 thermal units. Define the terms in italics, and calculate the initial temperature of the water. What was its vapour tension at that temperature?

4. Explain fully all that is meant by the formula H_2O . State why it would be wrong to assign a formula N_4O to air, and describe experimental proofs.

5. Describe the action of heat on each of the following substances:—Sulphur, ammonium chloride, nitrogen tetroxide, mercuric chloride, ferrous sulphate, sodium bicarbonate, and calcium carbonate.

6. Give a general description of the plant of a modern gas works, paying special attention to any process of enriching gas that you may be acquainted with.

7. Give a general description of the processes carried on in a tar distillery, with special reference to the construction of the stills and modes of working. Give a list of the more important substances derived from gas tar.

8. What is the chemical nature of aniline dyes? A general and not a detailed answer is requested.

9. Describe the basic process for the manufacture of Bessemer steel, pointing out the differences between it and the acid process.

10. Give a full account of the manufacture of viscose. Describe its properties, and mention some of the purposes for which it is used. What hazardous features are there connected with its manufacture?

11. What is petrol? Name substitutes for it, and discuss briefly their relative merits and demerits from the points of view of utility and fire hazard.

12. What are endothermic and exothermic reactions? Need fire-insurance people take any account of them? A full reply is requested to the second clause of this question.

LIFE BRANCH.

PART I, SECTION B.—PRACTICE OF OFFICES IN REGARD TO PROPOSALS, MEDICAL AND OTHER REPORTS.

FORMS OF POLICIES AND CONDITIONS OF ASSURANCE.

(Two hours allowed for this Paper.)

QUESTIONS.

1. A married woman proposes to effect a Policy on her own life for the benefit of her husband. Can this be done? If so, what information do you consider should be got for the proper consideration of the case?

2. Under what circumstances in your opinion would a proposal from a life who cannot be accepted at ordinary rates under a Whole Life Scale Policy be more favourably considered under an Endowment Assurance Policy?

3. Give a note of the principal points to be kept in view in framing a form of Medical Report.

4. An insurer, A.B., desires an Endowment Assurance Policy payable to himself on attaining a certain age if he survive, but to be payable to his wife, C.B., should he die before the maturity of the endowment, reverting to himself should she die before him. Draft the destination or payment clause of the Policy.

5. What difficulties occur to you (apart from the question of premium) in granting a policy-holder's request to convert his Policy from an Endowment Assurance scale to Whole Life scale and *vice-versa*? If it were agreed to in the latter case, draft a form of endorsement.

6. After a Policy has been in force for some years, on proof of age being furnished, it is found that proposer has understated his age in the proposal. What methods could be adopted to deal with the difficulty, and which would you recommend?

ACCIDENTAL BRANCH.

PART I. SUBJECT: CORRESPONDENCE.

(One hour and a half allowed for this Paper.)

QUESTIONS.

1. An employer, one of whose workmen has met with an accident in respect of which there is no legal liability, writes complaining that the Insurance seems useless, asking the grounds on which there is no liability and under what circumstances liability might attach to him. Write suitable letter in reply.

2. An agent with a large and valuable connection writes that he has been offered exceptional terms by another company, and

that under these circumstances, unless your company is prepared to offer him somewhat similar terms, he will feel compelled to transfer his policies as the renewals fall due. Write suitable letter in reply. Indicate also what steps you would take.

3. Write letter to an agent of influence, from whom you cannot get any satisfactory information as to whether he has carried through his renewals, or received the premiums due.

4. Your company has introduced a new and considerably extended form of Accident and Sickness Policy. Write suitable letter to your agents suggesting that they should endeavour to arrange for the holders of ordinary accident policies to cancel the latter in favour of the former system of insurance.

5. A policy-holder reports an accident some time after you have received intimation from the agent that the renewal was not taken up, and that the policy has accordingly lapsed. On pointing this out, the assured replies that the renewal was duly effected and the premium paid, and that he holds the official receipt.

(a) Write suitable letter to the assured. (b) Also to the agent.

ACCIDENTAL BRANCH.

PART I. SUBJECT: BOOK-KEEPING.

(Two hours and a quarter allowed for this Paper.)

QUESTIONS.

1. Give the necessary headings to be provided in a policy and renewal register for General Accident business.

2. Sketch ruling desirable for cash book in connection with agency accounts.

3. The following is a schedule of the wages paid to various classes of employees by a builder and general contractor, and the rate of premium charged for insurance in each class:—

Quarrymen	£1,500	20/-	0/0
General Building Staff ..	3,250	12/6	0/0
Sawyers	250	30/-	0/0
Yard Labourers	950	7/6	0/0
Carters	750	10/-	0/0
Clerical Staff	900	2/3	0/0

(a) Give the all-round rate for the insurance for first year.

(b) The result of the year's working shows the following wage certificate:—Quarrymen £1750, G.B. Staff £2917, Sawyers £300, Yard Labourers £1116, Carters £730, Clerical Staff £900. Work out gross renewal premium, no alteration in the rating.

4. Explain the difference between book-keeping by single and by double entry, and the advantages of the latter.

5. Having discovered that an amount of £5 which should have been debited to a certain agent's account has been credited by mistake to another agent, explain how you would proceed to rectify the error.

6. The following items appear to an agent's debit in ledger:—

G.A. Policy,	43,972	Prem. (new)	£6	0	0	
E.L. "	764,893	" (ren.)	8	7	3	and excess
						£1 4 2
E.L. "	792,471	" (new)	7	8	0	
Burg. "	58,762/3/4	" "	1	1	0	17/8
						5/-
T.P. "	64,728	" "	7	8	2	
G'tee "	25,478	" "	7	2	6	
" "	28,396	" (ren.)	4	5	0	
G.A. "	40,068	" "	5	10	0	

Commission as follows:—G.A. 15⁰/₁₀₀ new, 10⁰/₁₀₀ renl.
 E.L. 12¹/₂⁰/₁₀₀ and 10⁰/₁₀₀. Burg. 15⁰/₁₀₀. 3rd Party
 15⁰/₁₀₀. G'tee. 10⁰/₁₀₀ new, 7¹/₂⁰/₁₀₀ renl.

Prepare account, and allow 6/6 postage.

N.B.—*Special attention must be given to the form in which this account is worked out.*

ACCIDENTAL BRANCH.

PART I. SUBJECT: CLASSIFICATION OF RISKS (PERSONAL ACCIDENT).

(Three-quarters of an hour allowed for this Paper.)

QUESTIONS.

1. Into how many classes are risks usually divided by Accident Insurance Companies, and what are such classes called?

2. Give the correct classification of the following risks, according to the system of classification generally adopted—commercial traveller, miller (corn), butcher, veterinary surgeon, steeple-jack, clerk, police sergeant, police superintendent, cattle salesman, surveyor, slaughterman, admiral of a fleet.

3. Mention a few occupations not generally acceptable.

ACCIDENTAL BRANCH.

PART I. SUBJECT: KNOWLEDGE OF EMPLOYERS' LIABILITY.

(One hour and a half allowed for this paper.)

QUESTIONS.

1. Give the various Acts of Parliament (with dates) bearing on the question of liability to employers for accident to their employees.

2. To whom has the compensation under the Workmen's Compensation Act in respect of fatal accidents to be paid?

3. Specify which of the following persons would be entitled to claim compensation as dependents under the Workmen's Compensation Act, assuming satisfactory proof of dependency be produced:—mother, stepfather, daughter, niece, sister, stepson, aunt, wife, illegitimate child, brother, grandchild, great-grandchild, husband.

4. Presuming, in case of fatality, an employer was liable under the 1880 Act, and/or 1897 Act, and you were dependent, which act would you elect to claim under, and why?

5. An injured workman having received compensation under the W.C.A. for a lengthy period, and you being of opinion that ability to work exists, and he refusing to resume work, what steps would you take?

6. Under what circumstances can an injured workman recover compensation under the 1880 Act?

ACCIDENTAL BRANCH.

PART II. SUBJECT: CLAIMS AND THEIR SETTLEMENTS.

(One hour and a half allowed for this Paper.)

QUESTIONS.

PERSONAL ACCIDENT:

1. (a) What is the general definition of "accident" as applying in personal accident policies?

(b) Distinguish between permanent total disablement and temporary partial disablement.

2. A policy-holder, stating in his proposal *inter alia* that he had not suffered from erysipelas, sustained an accident, and erysipelas supervened. It is discovered that he had that complaint several times prior to his effecting an insurance. What should you do?

3. A policy-holder informs you that some six weeks previously he injured his leg, but did not consider it sufficiently serious to

need medical advice, but now desires to claim partial disablement for the period named. How would you deal with the case?

E.L. Act, 1880:

4. A workman having met with an accident on a building in course of erection through the fall of scaffolding, what points has he to establish to enable him to recover from his employer?

5. Explain the doctrine of

(a) Common employment.

(b) *Volenti non fit injuria*.

W.C. Act, 1897:

6. How would you ascertain the amount due to the total dependents of a workman killed after having been in the employment of the insured (a) $2\frac{1}{2}$ years, (b) $2\frac{1}{2}$ days?

7. What are the necessary preliminaries to be observed in order to maintain proceedings under the Workmen's Compensation Act?

ACCIDENTAL BRANCH.

PART II. SUBJECT: POLICY DRAFTING.

(One hour allowed for this Paper.)

QUESTIONS.

1. The following endorsement was placed upon an Employer's Insurance Policy—"The within-named employer not having declared any sum for sub-contracts, the liability for sub-contractors' men is excluded from the policy." Have you any improvement to suggest in this endorsement; if so, what? Draw fresh endorsement.

2. The holder of a Third Party Policy has a horse which has already caused two accidents. Your company having requested him to part with the horse, and he being unwilling to do so, agrees to take the risk of any such further accident himself, draft suitable endorsement to be placed on the policy.

3. Draw endorsement on a General Accident Policy suitable for proposer who has stated that he has suffered from gout.

ACCIDENTAL BRANCH.

PART II., SUBJECT: INDEMNITY (Third Party).

(Two hours allowed for this Paper.)

QUESTIONS.

CORRESPONDENCE:

1. Write fully to an agent who has been asked to quote for a "Third Party Risk" and who advises you he does not understand the matter.

2. Write to a firm of warehousemen who have enquired approximate rates, and state what information you would require to enable you to quote definitely.

CLAIMS :

3. Your company have the risk in connection with the laying of tram lines along a public road. A claim for damages is made by a cyclist who states he was at night thrown into the works. How would you investigate?

SETTLEMENT :

4. A husband and wife carrying on business as drapers and milliners (both working in the business) are thrown from a trap, under circumstances creating clear liability on the part of an omnibus proprietor insured with your company, and are severely injured. How would you proceed to settle the claim and on what basis?

LEGAL ASPECTS :

5. Under what circumstances can an injured person, or one whose property has been damaged, recover against a Third Party?

6. What alteration of law was effected by the passing of Lord Campbell's Act in relation to injuries caused by Third Parties?

ACCIDENTAL BRANCH.

PART II. SUBJECT: MEDICAL AND SURGICAL TERMS

(One hour allowed for this Paper.)

QUESTIONS.

1. Explain the following :—

- (a) Colles' Fracture.
- (b) Pott's Fracture.
- (c) Fracture of the neck of the Femur.

2. Where are the following bones to be found, and how many of each are there in the human body—Metatarsal bones, Scapula, Sternum, Astragalus, Os calcis?

3. Explain in your own language, the terms—Ankle clonus, Patellar reflexes, Septicæmia, Ankylosis, Traumatic.

4. Give the names of the bones found in the arm from the shoulder to the wrist.

NAMES OF SUCCESSFUL CANDIDATES, 1904—continued.

	PART I.							PART II.							PART III.				
	Policy Drafting.		Re-insurances.	General Rules.	Book-keeping.	Chemistry.	Electricity.	Passed in Part I.	Tariffs.			Processes.		Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.		
	Shoe.	Clothing.							Boot and	Sprinklered Corn.	Clothing.	Flour.	Boots and Shoes.						
GLASGOW.	P	P	H	H	C	C	C	1904	..	..	..	..	..	..	..	..	1904
Laidlaw, A., Atlas ...	..	..	..	..	C	C	..	..	..	..	..	..	..	..	..	..	..
Laidlaw, J. H., North British and Mercantile	..	P	..	..	C	C	..	..	..	..	P	..	..	P	..	..	..
Macfarlane, J. M., North British and Mercantile	P	P	P	H	C	..	..	..	..	..	..	..	..	..	..	..	..
Robertson, S., Westminster ...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
LEEDS.																			
Bastow, J. A., Atlas ...	..	..	..	..	..	..	..	C 1904	..	..	..	..	..	..	..	..	..
Bennett, J. E., Law Union and Crown	..	P	..	..	..	..	..	..	..	..	..	..	..	P	..	..	..
Braithwaite, W. E., Royal ...	..	..	..	H	..	..	..	..	..	..	..	..	..	..	..	..	..
Buckley, H. S., London and Lancashire	..	P	P	H	C	..	..	..	..	..	..	..	..	..	..	P	..
Coates, A. O., Yorkshire ...	..	..	..	..	..	..	..	C 1904	..	..	..	..	..	..	..	..	1904
Croeland, G. H., British Law	..	..	..	..	..	..	..	..	H	P	..	..	..	..	..	..	..

[illegible]

NAMES OF SUCCESSFUL CANDIDATES, 1904—continued.

	PART I.						PART II.						PART III.						
	Policy Drafting.		Re-insurances.	General Rules.	Book-keeping.	Chemistry.	Electricity.	Passed in Part I.	Tariffs.			Processes.		Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.	Law of	
	Shoe.	Clothing.							Boot and Shoe.	Sprinklered Corn.	Clothing.	Flour.	Boots and Shoes.						
MANCHESTER—continued.	P	..	..	C	C	..	..	..	..	..	..	..	..	..	..	..
Hartop, S. A., Caledonian	Chemistry.	
Hirst, P. B., National	H	..	P	..	..	..	..	..	..	..	..	..	..	..	..	..	Electricity.	
Jackson, E. S., Manchester	H	..	H	..	..	..	..	..	..	..	..	..	..	..	..	..	Sprinklers.	
Jackson, G. V., Co-operative	H	H	..	..	..	..	..	..	..	..	..	..	..	..	..	Average Clauses.	
Mason, J. H., Northern	H	P	P	..	..	..	..	..	..	..	..	..	..	..	..	..	Fire Insurance.	
Mills, W. H., Commercial Union	C	C	C	1904	..	..	..	..	..	..	..	H	..	..
Mottam, E. H., Manchester...	P	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Rogers, W. B., County	H	P	H	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Smith, H., Commercial Union	..	P	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Smith, S. A. G., Alliance	C	..	..	..	..	..	..	..	..	..	..	..	..	..

[illegible]

NEWCASTLE.

Allen, D. C., <i>North British and Mercantile</i>	
Armstrong, R. P., <i>Royal Exchange</i>	
Barclay, J. H., <i>Manchester</i>	...
Gardner, R. O., <i>Royal</i>	...
Gofton, J. P., <i>Royal</i>	...
Gofton, W., <i>London and Lancashire</i>	
Hansen, G. E., <i>Norwich Union</i>	
Hicks, J. E., <i>North British and Mercantile</i>	
Hopper, W. J., <i>Royal</i>	...

NOTTINGHAM.

Mallett, R. W., *Northern* ...

PERTH.

Brown, R., Jr., *General Accident* ...Campbell, K., *General Accident* ...

SHEFFIELD.

Phillips, L., *Alliance* ...Pughe, L. E., *Alliance* ...

LIFE BRANCH—Part I.

Lee, J. H., *Equity and Law Life*, Leeds ...Rushton, T. A., *Prudential*, Manchester ...

P ...

NAMES OF SUCCESSFUL CANDIDATES, 1904—continued.

ACCIDENT BRANCH.

	PART I.					PART II.				
	Corres- pondence.	Book- keeping.	Classifi- cation.	Em- ployers' Liability	Passed in Part I.	Claims.	Policy Drafting Insurance.	Indem- nity Insurance.	Medical, &c., Terms.	Passed in Part II.
BRISTOL.										
Iles, H. J., <i>Royal Exchange</i>	...	...	...	...	...	P	...	...	...	...
EDINBURGH.										
Black, R., <i>Ocean</i> ...	H	P	H	P	1904	...	...	...	...	...
Taylor, E. N., <i>Ocean</i> ...	P	...	P	H	...	...	...	...	...	...
GLASGOW.										
Robertson, J. S., <i>Rock</i> ...	...	...	H	...	...	...	...	...	...	...
Smith, A. D., <i>Railway Passengers</i> ...	...	...	P	...	...	...	...	...	...	...
Walker, H. F., <i>London and Lancashire</i>	...	...	H	P	...	...	...	...	...	...
LIFEDS.										
Coltman, A., <i>Employers' Liability</i> ...	...	...	...	..	...	...	P	...	...	1904

[illegible]

THE INSURANCE INSTITUTE OF TORONTO.

RESULTS OF 1904 EXAMINATIONS.

First Examination. Fire and Life Branches.

NAME.	Company.	Arith- metic.	Euclid.	Algebra.	Compo- sition.	Book- keeping.	Geo- graphy.
Adams A. W. . .	Imperial . .	P	..	..	P	P	..
Aitken, W. H. . .	Western . .	..	..	..	P	..	..
Campbell, J. N. . .	Canada . .	P	P	..	P	P	..
Crosby, G. E. . .	Western . .	P	P	P	H	P	P
Cuthbertson, A. E. .	Canada . .	H	H	..	H	P	H
Domelle, J. H. . .	Canada . .	P	P	..	P	P	H
Euler, J. . .	Crown . .	H	H	H	H	..	..
Gallow, J. O. . .	Imperial . .	P	..	..	P	..	P
Gibson, C. D. E. . .	Western . .	..	..	..	P	P	P
Hines, W. A. . .	Canada . .	..	..	..	P	..	..
Lanskill, G. J. A. . .	Canada . .	..	..	..	P	P	H
Macklin, C. C. . .	Canada . .	P	H	..	H	P	P
Martin, B. P. . .	Western . .	P	..	..	P	..	P
MacDonald, C. M. . .	Canada . .	..	P	..	..	..	..
MacKenzie, A. G. . .	Imperial . .	..	..	..	..	..	P
McIlwraith, W. N. . .	Canada . .	H	H	..	H	P	H
Nosworthy, H. W. . .	Imperial . .	..	..	..	H	..	..
Ohlen, G. T. . .	Manufactra. .	..	..	..	P	F	..
Pringle, F. . .	Royal . .	..	..	..	..	..	P
Reynolds, V. E. . .	Canada . .	P	P	..	P	P	H
Robb, A. M. . .	Canada . .	..	..	..	..	P	..
Robertson, C. E. . .	Canada . .	..	..	..	P	..	..
Roesler, H. T. . .	Imperial . .	..	..	..	P	..	P
Salmon, B. . .	Canada . .	..	P	..	H	P	P
Singer, L. M. . .	Lond. & Lan. .	..	..	..	..	P	..
Starr, F. H. . .	Canada . .	..	..	..	P	..	P
Stuart, C. J. S. . .	Canada . .	H	H	H	H	..	H
Woodcock, W. A. . .	Canada . .	..	H	H	..	P	H

Second Examination. Life Branch.

NAME.	Company.	Use of Logarithms, Interest, and Dis. Tables	Practice of Companies as to Applica- tions, &c.	Practice of Companies as to Loans, &c.	Plans of Assurance, &c.	Correspon- dence, Literature, Advertising.	Elementary Principles of Life Assur- ance Law.
Macorquodale, F. D. .	Manufactra. .	..	..	..	..	P	P
Portch, A. G. . .	Canada . .	H	..	..	..	..	..
Prest, A. J. . .	Manufactra. .	P	H	P	P	..	P
Winfield, F. E. . .	Manufactra. .	..	..	H	..	..	H

Second Examination. Fire Branch.

NAME.	Company.	General R. and T. of the C. F. U. A.	Average and Co-Insurance Clauses.	Plan Drawing to Scale.	Chemistry, Elementary.	Re-Insurance.	Correspon- dence, &c.	Building Construction.	Electricity, Elementary.
Fudger, W. E. -	British America	H	P	P	P	H	P	P	P
Hall, O. E. -	Norwich Union -	H	P	P	..	H	H	H	P
Jocelin, H. A. -	Norwich Union -	P	..	P	H	H	..	P	P
Lauder, W. -	Gen. Fire Equip.	..	..	P	..	..	..	H	P
McLean, E. L. -	Western -	H	P	P	P	H	P	H	H
Roberts, F. E. -	Norwich Union -	P	P	P	H	H	P	H	H
Rodgers, A. H. -	Norwich Union -	P	P	P	..	H	H	P	P
Shaw, J. -	Norwich Union -	H	P	P	P	H	P	P	H
Singer, L. M. -	London & Lancs.	P	..	P	P	H	P	P	H
Szelski, P. -	British America	H	P	P	P	H	P	H	H

INDEX

OF VOLUMES I. TO VI. INCLUSIVE.

ACCIDENT.	VOL.	PAGE.
EMPLOYERS' LIABILITY: ITS HISTORY, LIMITATIONS, AND EXTENSIONS. By Charles H. Green,	I.	269
EMPLOYERS' LIABILITY AND THE WORKMEN'S COMPENSATION ACT, 1897. By Charles H. Green,	III.	443
PERSONAL ACCIDENT INSURANCE. By Alfred Foot, F.S.S.,	V.	329
SICKNESS INSURANCE. By Henry Brown,	I.	233
WORKMEN'S COMPENSATION. By C. H. Franklin,	IV.	371

FINANCIAL AND GENERAL.

ADDRESS by N. B. Gunn, F.F.A., F.I.A., Glasgow,	IV.	xxv
AIMS AND REWARDS OF AN INSURANCE CAREER. By John Rodger,	IV.	419
BYE-LAWS OF THE FEDERATION,	VI.	xli
CONSTITUTION OF THE FEDERATION,	VI.	xxxv
ECONOMICS OF INSURANCE: THE. By John M. M'Candlish, F.R.S.E., F.F.A.,	I.	53
ETHICS OF INSURANCE. By T. E. Young, B.A., F.I.A.,	I.	211
HELPS AND HINDRANCES. By B. Hal Brown, F.S.S.,	V.	291
INSURANCE FIELD WORK: ITS LIGHTS AND SHADOWS. By Robert Chapman,	VI.	395
INVESTMENTS. By David Deuchar, F.R.S.E., F.F.A., F.I.A.,	I.	305
LEGAL TITLE: DAILY QUESTIONS OF. Notes on Stamp Duties. By Warren Crosbie, B.L.,	IV.	335
MARINE INSURANCE: A BIRD'S-EYE VIEW OF THE PRESENT SYSTEM OF. By Charles Macarthur,	I.	105
MARINE INSURANCE: HISTORY AND PRACTICE OF. By Douglas Owen,	IV.	395
MORTGAGES. By James Robert Hart, F.I.A.,	V.	235

	VOL.	PAGE.
ORPHANAGE : REPORT OF THE GENERAL COMMITTEE OF THE INSURANCE CLERKS',	VI.	xxvii
SCOPE AND WORK OF THE INSURANCE INSTITUTES. By Charles Povah,	II.	411

FIRE.

ACCUMULATION IN FIRE RISK. By James Robb, ...	I.	1
ASPECT OF ELECTRICITY FROM AN INSURANCE POINT OF VIEW : THE. By B. Chatterton, Ass. M. Inst. C.E.,	IV.	1
AVERAGE CONDITIONS OF A FIRE INSURANCE POLICY. By Samuel J. Pipkin,	I.	243
BAKERIES. By A. M. Clydesdale,	V.	89
BLEACH WORKS. By John W. Webster,	II.	223
BOOT AND SHOE FACTORIES. By John P. Green,	II.	301
BREWERIES AND DISTILLERIES. By W. S. Kinnear, B.A.,	II.	185
BRUSH FACTORIES. By D. C. Campbell,	VI.	109
COAL-TAR DISTILLING AND CHEMICAL MANURE MANU- FACTURING. By C. E. Truffitt,	IV.	21
COLD STORES. By J. A. Bewly,	VI.	51
COLLIERIES. By John G. Boss,	II.	283
CONFECTIONERY WORKS. By J. Headon Boocock,	V.	111
CORN MILLS. By James Wardle,	III.	169
COST PRICE OF FIRE INSURANCE. By James Ostler,	III.	255
COTTON FACTORIES AND SHEDS. By J. H. Bagshaw,	III.	87
COTTON SPINNING MILLS. By Thomas A. Bentley,	II.	253
COTTON SPINNING MILLS (Second Part). By Thomas A. Bentley,	IV.	37
CYCLE FACTORIES. By A. E. Patrick,	IV.	269
DRAFTING FIRE INSURANCE CONTRACTS. By C. E. Noverre,	II.	113
FARMS AND FARMING STOCK. By C. R. Quinton,	III.	151
FELT HAT WORKS. By J. H. Chapman,	III.	1
FIRE-EXTINCTION EXPENSES. By H. Orton Smith,	V.	367
FIRE HAZARD OF THE MORE IMPORTANT CHEMICAL PRODUCTS. By Dr. E. H. Cook, M.A., F.I.C., F.C.S.,	III.	63
FIRE HAZARD OF CENTRAL CITY DISTRICTS : THE GROWING. By David L. Laidlaw,	I.	81
FIRE INSURANCE. By John M. M'Candlish, F.R.S.E., F.F.A.,	III.	319

	VOL.	PAGE.
FIRE-PROOF BUILDINGS AND FIRE-RESISTING FLOORS.		
By William Beeston,	V.	189
FIRE RISKS FROM A CHEMICAL STANDPOINT. By		
Walter G. Macmillan,	I.	293
FLAX MILLS, IRELAND. By James Black,	V.	71
GASWORKS. By J. H. Chapman,	IV.	49
HEATING AND VENTILATION. By William Sutcliffe, ...	IV.	105
INSURANCE OF CUSTOMERS' GOODS. By Robert Taylor, ...	VI.	35
JUTE MILLS. By A. D. K. Brown,	VI.	117
LACE FACTORIES. By W. H. Maryan,	VI.	93
LONDON MANCHESTER-WAREHOUSES. By Philip F.		
Brooks, F.S.I.,	V.	1
LOSS SETTLEMENTS: POLICY CONDITIONS AND THEIR		
BEARING UPON. By William Montgomery, Jr., ...	I.	195
MANCHESTER SHIP CANAL WAREHOUSES. By Thomas A.		
Bentley,	VI.	1
MANCHESTER WAREHOUSES. By J. W. K. Schofield, ...	VI.	177
MANSION-HOUSES AS FIRE RISKS. By C. R. Quinton, ...	V.	117
METAL WORKING RISKS. By J. Headon Boocock, ...	III.	123
MODERN CORN MILL: THE. By James Ostler,	I.	19
PLAN DRAWING: FIRE INSURANCE. By Pat. B. Carphin, ...	IV.	143
POTTERIES. By Frank R. Perowne,	IV.	157
PROGRESS OF FIRE PROTECTION. By P. H. Sims, ...	VI.	225
PROGRESS AND PROSPECTS OF FIRE INSURANCE AS A		
SCIENCE: OBSERVATIONS ON THE. By David L.		
Laidlaw,	III.	293
ROLLER MILLING. By Alexander B. Dansken,	III.	201
ROPE WORKS. By Owen D. Jones,	III.	129
SALVAGE CORPS: THE BENEFITS TO BE DERIVED BY		
FIRE INSURANCE COMPANIES FROM THE ESTAB-		
LISHMENT OF. By William Postdown,	II.	87
SAW MILLS AND WORKERS IN WOOD. By T. B. Red-		
gate,	V.	135
SHIPBUILDING YARDS AND MARINE ENGINEERING		
WORKS. By Arthur H. Knight,	III.	271
TANNING AND CURRYING. By George Chappell,	II.	1
TARIFF LEGISLATION. By F. J. Kingsley,	II.	323
TARIFF ORGANISATION IN CONNECTION WITH FIRE		
INSURANCE BUSINESS. By David Deuchar,		
F.R.S.E., F.F.A., F.I.A.,	VI.	xlv
THEATRES AND MUSIC-HALLS. By Thomas A. Bentley, ...	IV.	251
TIMBER YARDS. By J. R. Liddell,	VI.	197

